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WATER-SUPPLY PAPER 306

SURFACE WATER SUPPLY OF THE UNITED STATES

1911

PART VI. MISSOURI RIVER BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

W. A. LAMB, W. B. FREEMAN, AND
RAYMOND RICHARDS

WASHINGTON
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SURFACE WATER SUPPLY OF THE MISSOURI RIVER BASIN, 1911.

By W. A. LAMB, W. B. FREEMAN, and RAYMOND RICHARDS.

AUTHORITY FOR THE WORK.

This volume is Part VI of a series of 12 reports presenting results of measurements of flow made on certain streams in the United States during the calendar year 1911. The reports are listed in the following table:

Papers on surface water supply of the United States, 1911.

Part.[a]	No.	Title.
I	301	North Atlantic coast.
II	302	South Atlantic coast and eastern Gulf of Mexico.
III	303	Ohio River basin.
IV	304	St. Lawrence River basin.
V	305	Upper Mississippi River and Hudson Bay basins.
VI	306	Missouri River basin.
VII	307	Lower Mississippi River basin.
VIII	308	Western Gulf of Mexico.
IX	309	Colorado River basin.
X	310	Great Basin.
XI	311	Pacific coast in California.
XII	312	North Pacific coast.

[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394), which contains the following paragraph:

> *Provided*, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation.

Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States and for the investigation of underground currents and artesian wells and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work many private and State organizations have cooperated. Acknowledgments for such cooperation are made on pages 13–14, and also in connection with the description of each station affected by the cooperative work.

PUBLICATIONS.

Measurements of stream flow have been made at nearly 2,000 points in the United States, and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1911 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points in the United States, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country, and will be made available in the regular surface water supply papers from time to time. A complete list of the gaging stations maintained by the Survey to and including 1910, and a list of the papers relating to the water supply of the country, have been published by the Survey as Water-Supply Paper 280. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119.

For each calendar year there has been prepared a report embodying the stream-flow data collected during that year, which has been published either as a part of the Annual Report of the Director, as a bulletin, or as a water-supply paper, as shown by the following table:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and rating	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, mesurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	.....do	1903.
WS 124 to 135	.....do	1904.
WS 165 to 178	.....do	1905.
WS 201 to 214	Complete data, except descriptions	1906.
WS 241 to 252	Complete data	1907–8.
WS 261 to 272	.....do	1909.
WS 281 to 292	.....do	1910.
WS 301 to 312	.....do	1911.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1911. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1911, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, and 301, which contain records for the New England streams from 1903 to 1911.

Numbers of water-supply papers containing results of stream measurements, 1899–1911.

	1899 [a]	1900 [b]	1901	1902	1903	1904
North Atlantic Coast (St. John River to York River)	35	47, [c] 48	65, 75	82	97	[d] 124, [e] 125, [f] 126
South Atlantic Coast and Eastern Gulf of Mexico (James River to the Mississippi)	[g] 35, 36	48	65, 75	[g] 82, 83	[g] 97, 98	[f] 126, 127
Ohio River Basin	36	48, [h] 49	65, 75	83	98	128
St. Lawrence River and Great Lakes	36	49	65, 75	[i] 82, 83	97	129
Hudson Bay and Upper Mississippi River	36	49	[j] 65, 66, 75	[j] 83, 85	[j] 98, 99, 100	[j] 128, 130
Missouri River	[k] 36, 37	49, [l] 50	66, 75	84	99	130, [m] 131
Lower Mississippi River	37	50	[j] 65, 66, 75	[j] 83, 84	[j] 98, 99	[j] 128, 131
Western Gulf of Mexico	37	50	66, 75	84	99	132
Colorado River	[n] 37, 38	50	66, 75	85	100	133
Great Basin	38, [o] 39	51	66, 75	85	100	133, [p] 134
Pacific Coast in California	38, [q] 39	51	66, 75	85	100	134
North Pacific Coast	38	51	66, 75	85	100	135

[a] Rating tables and index to Water-Supply Papers 35–39 continued in Water-Supply Paper 39.

[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

[c] Wissahickon and Schuylkill rivers to James River.

[d] New England rivers only.

[e] Hudson River to Delaware River, inclusive.

[f] Susquehanna River to Yadkin River, inclusive.

[g] James River only.

[h] Scioto River.

[i] Lake Ontario and tributaries to St. Lawrence River proper.

[j] Tributaries of Mississippi from east.

[k] Gallatin River.

[l] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

[m] Platte and Kansas rivers.

[n] Green and Gunnison rivers and Grand River above junction with Gunnison.

[o] Mohave River only.

[p] Great Basin in California, excepting Truckee and Carson drainage basins.

[q] Kings and Kern rivers and south Pacific coast drainage basins.

Numbers of water-supply papers containing results of stream measurements, 1899–1911—Continued.

	1905	1906	1907–8	1909	1910	1911
North Atlantic coast (St. John River to York River)	[a] 165, [b] 166, [c] 167	[a] 201, [b] 202, [c] 203	241	261	281	301
South Atlantic Coast and Eastern Gulf of Mexico (James River to the Mississippi)	[c] 167, 168	[c] 203, 204	242	262	282	302
Ohio River Basin	169	205	243	263	283	303
St. Lawrence River and Great Lakes	170	206	244	264	284	304
Hudson Bay and upper Mississippi River	171	207	245	265	285	305
Missouri River	172	208	246	266	286	306
Lower Mississippi River	[d] 169, 173	[d] 205, 209	247	267	287	307
Western Gulf of Mexico	174	210	248	268	288	308
Colorado River	175, [e] 177	211	249	269	289	309
Great Basin	176, [f] 177	212, [f] 213	250, [f] 251	270, [f] 271	290	310
Pacific coast in California	177	213	251	271	291	311
North Pacific coast	[g] 177, 178	214	252	272	292	312

[a] New England rivers only.
[b] Hudson river to Delaware River, inclusive.
[c] Susquehanna River to Yadkin River, inclusive.
[d] Tributaries of Mississippi from east.
[e] Below junction with Gila.
[f] Great Basin in California, excepting Truckee and Carson dainage basins.
[g] Rogue, Umpqua, and Siletz rivers only.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off depth in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off, depth in inches," is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge in second-feet per square mile.	Run-off in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.03719	1.041	1.079	1.116	1.153
2	.07438	2.083	2.157	2.231	2.306
3	.11157	3.124	3.236	3.347	3.459
4	.14876	4.165	4.314	4.463	4.612
5	.18595	5.207	5.393	5.578	5.764
6	.22314	6.248	6.471	6.694	6.917
7	.26033	7.289	7.550	7.810	8.070
8	.29752	8.331	8.628	8.926	9.223
9	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge in second-feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	1.983	55.54	57.52	59.50	61.49
2	3.967	111.1	115.0	119.0	123.0
3	5.950	166.6	172.6	178.5	184.5
4	7.934	222.1	230.1	238.0	246.0
5	9.917	277.7	287.6	297.5	307.4
6	11.90	333.2	345.1	357.0	368.9
7	13.88	388.8	402.6	416.5	430.4
8	15.87	444.3	460.2	476.0	491.9
9	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply the values for one day by the number of days.

1 second-foot equals 40 California miner's inches (law of March 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.

1 second-foot for one year equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one day equals 86,400 cubic feet.

1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for 1 day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.

100 California miner's inches equals 18.7 United States gallons per second.

100 California miner's inches for one day equals 4.96 acre-feet.

100 Colorado miner's inches equals 2.60 second-feet.

100 Colorado miner's inches equals 19.5 United States gallons per second.

100 Colorado miner's inches for one day equals 5.17 acre-feet.

100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$=net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data, so far as available, are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharge, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact

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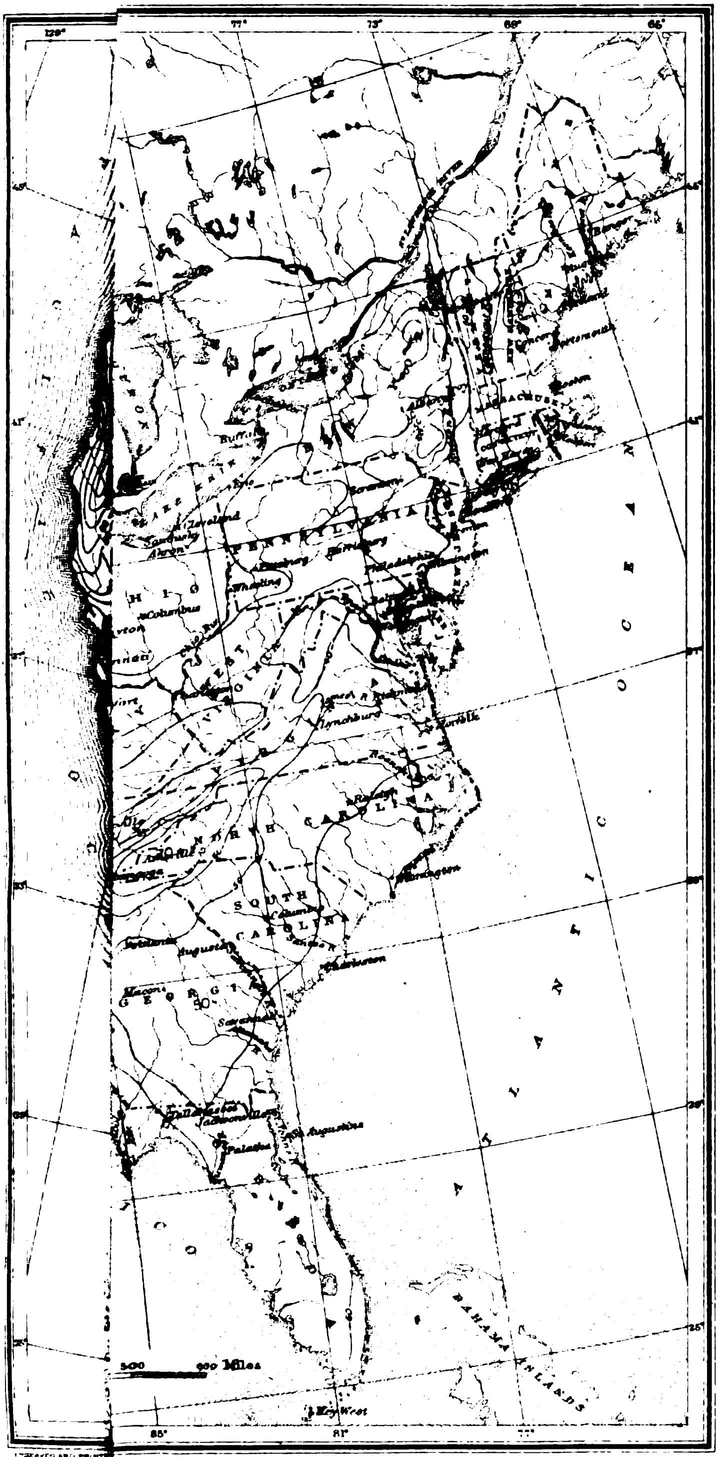
WATER-SUPPLY PAPERS 301 TO 312 PLATE I



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Prepared by Henry Gannett
mainly from data of the
United States Geological Survey
and United States Weather Bureau

that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage heights and daily discharge as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater periods.

The table of daily discharge gives the discharge in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 12, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plates I and II show the average precipitation and run-off in the United States as determined from the measurements of stream flow made by the Geological Survey and records of rainfall collected by the Weather Bureau; Plate III shows typical gaging stations; Plate IV shows current meters[1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate" within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should therefore be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general the base data collected each year by the Survey engineers are published not only to comply with the law but to afford

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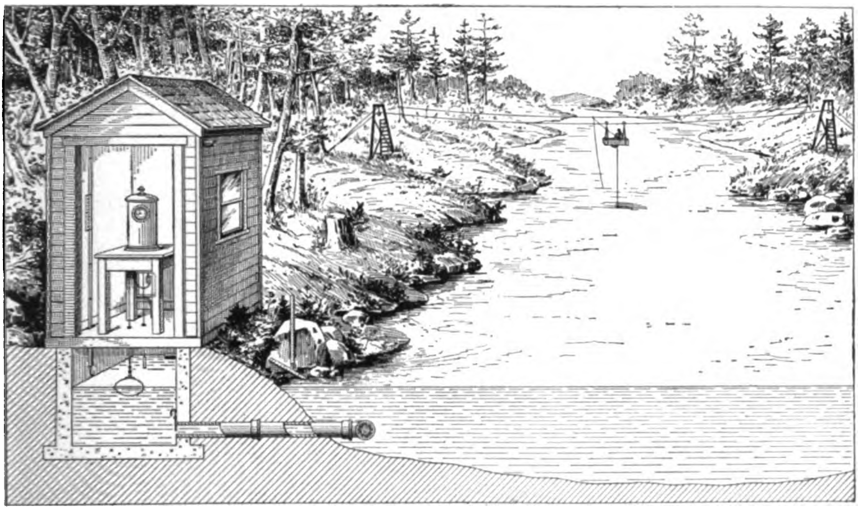
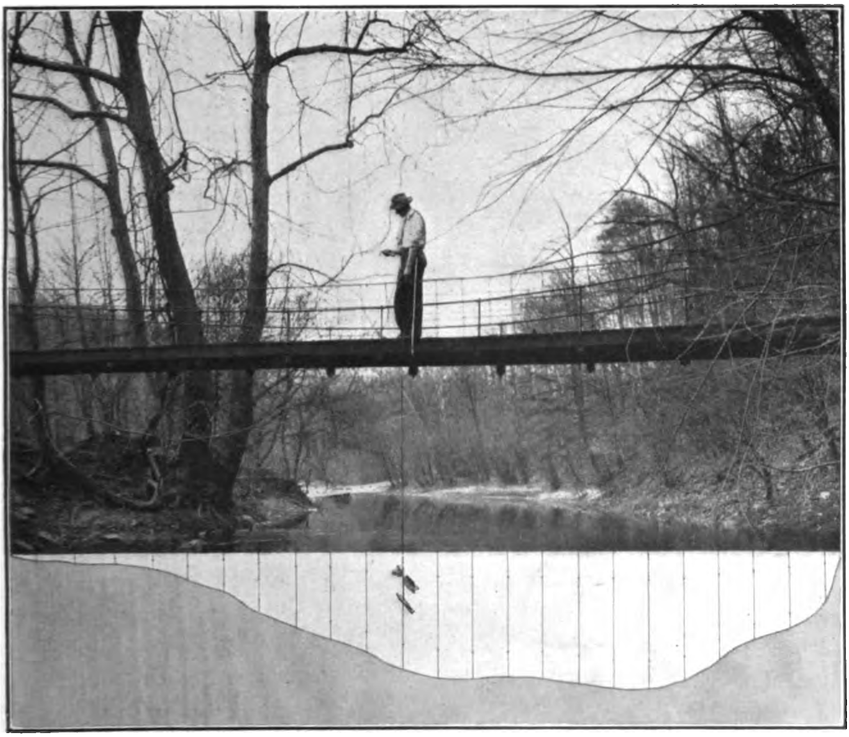
[1] See Hoyt, J. C., and others, Use and care of current meter as practiced by the United States Geological Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

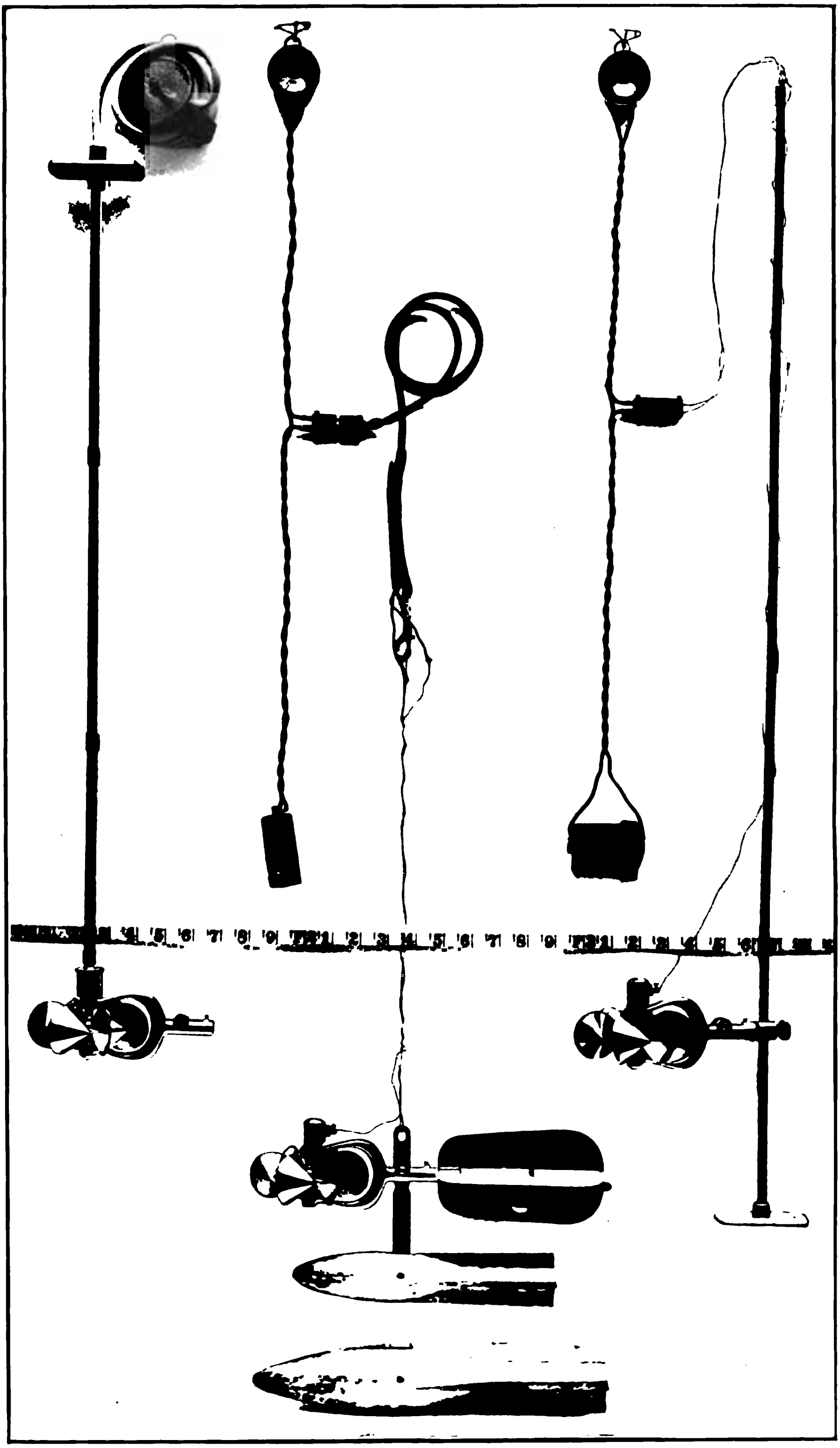


A. CABLE STATION WITH AUTOMATIC GAGE.



B. FOR BRIDGE MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION AND ASSISTANCE.

MONTANA.

Much of the work in Montana has been carried on under cooperative agreement with the United States Reclamation Service, the work being done by the Geological Survey and the expense borne by the Reclamation Service.

The State of Montana also cooperated in the work, authority having been granted by the State legislature in 1911, which passed a bill appropriating $3,000 for 1911 and $3,000 for 1912, to be expended on the work of gaging streams, in accordance with paragraph 3, section 2244, of the Revised Codes of 1907 of the State of Montana, which reads as follows:

> The State engineer shall become conversant with the waterways of the State and the needs of the State as to irrigation matters; shall make, or cause to be made, measurements and calculations of the ordinary and flood discharge of streams, cooperating in this work as much as possible with the United States Geological Survey and the Montana Experiment Station; such measurements to be made on streams in order of their importance, provided that measurements already made, if deemed reliable, may be adopted.

Much of this fund has been expended on work in connection with Carey projects.

A number of stations in the western part of Montana were maintained in cooperation with the Forest Service.

Acknowledgments are due to the several Carey Land Act companies for salaries of gage observers paid during the year; to the United Missouri River Power Co., for records on Missouri River; to the Glass-Lindsay Land Co., for gage observers' salaries at several stations; and to George E. Baker, for gage heights and discharge measurements on Pipestone and Whitehall creeks.

COLORADO.

The work in Colorado was carried on in cooperation as follows:

The United States Forest Service furnished the services of a hydrographer for measuring the streams on the national forests and also furnished the gage heights.

Mr. C. W. Comstock, State engineer, cooperated in maintaining a number of stations in the South Platte basin and furnished the completed records for a number of other stations.

Mr. George B. McFadden, of Denver, furnished the field data for two stations on the Cache la Poudre.

WYOMING.

The work in Wyoming was carried on in cooperation as follows:

Mr. A. J. Parshall, State engineer, paid half the field expense of maintaining most of the Wyoming stations and also paid the gage observers. He also arranged for cooperation with a number of individuals interested in the different records.

The United States Forest Service furnished the services of a hydrographer during the latter part of the year for measuring the streams on the national forests and also furnished the gage heights.

The United States Reclamation Service furnished the completed records on the North Platte at Pathfinder and Whalen and gage heights and gate openings on the Shoshone at Corbett dam.

NEBRASKA.

The work in Nebraska was carried on in cooperation with Mr. D. D. Price, State engineer, who furnished all the field data.

Acknowledgments are also due to the United States Weather Bureau and all other companies and persons who have rendered assistance and furnished records.

DIVISION OF WORK.

The work in the upper Missouri River basin was under the direction of W. A. Lamb, district engineer, assisted by Raymond Richards, assistant engineer, John C. Beebe and Benjamin E. Jones, junior engineers, and C. S. Heidel, State hydrographer.

The work in North Dakota was carried on by E. F. Chandler, assistant engineer, assisted by Gorie Monley and George Ebner.

The field data for the Missouri River drainage area in Colorado and the North Platte and upper Bighorn basins in Wyoming were collected under the direction of W. B. Freeman, district engineer, assisted by G. A. Gray, E. O. Christiansen, G. H. Russell, and R. H. Fletcher, junior engineers, and O. M. Wimmer and H. B. Waha, Forest Service hydrographers.

The field data in Nebraska were collected under the direction of D. D. Price, State engineer, assisted by A. A. Dobson and A. B. Price.

The rating curves and special estimates were made and the completed data prepared for publication by Raymond Richards. Computations have been made by H. J. Dean, A. H. Tuttle, and M. I. Walters. The report has been edited by Mrs. B. D. Wood.

APPROPRIATION OF WATER.

VARIATIONS IN STATE WATER LAWS.

The water laws of the Western States differ so widely in their provisions that such terms as "water filing," "appropriation," and "water right" have no general application or meaning. The rights to water in these States rest in general, first, on the Constitution and statutes of the United States; second, on the respective State constitutions and the State statutes that have been enacted in accordance therewith; third, on the decisions of Federal and State courts in the interpretation of these various provisions of law and in their application to specific conditions; and, fourth, on the requirements of the State engineers and other officials charged with the administration of the State water laws.

In addition, the right to convey water across public lands must be acquired in accordance with the provisions of the acts of Congress and the regulations of the Secretary of the Interior and the Secretary of Agriculture pursuant thereto.

In this report each description of a gaging station in Colorado gives the number of second-feet of adjudicated diversions from the stream and its tributaries, to indicate as nearly as possible the extent to which appropriations have been recognized by the State courts. It does not follow, however, that this amount of water is actually diverted, as many of the older decrees called for amounts greatly in excess of those actually used; on the other hand, no account has been taken of filings which have not yet been perfected and adjudicated. It is impossible from the State records to reach any conclusion as to the validity of these filings or as to the probability of their final perfection.

CONSTITUTIONAL PROVISIONS.

COLORADO.

In common with most of the other Western States, Colorado has discarded the common-law doctrine of riparian rights and has established a system based upon prior appropriation. The following are extracts from the State constitution relative to the use of water for irrigation:

ARTICLE XVI.

IRRIGATION.

SEC. 5. The water of every natural stream not heretofore appropriated within the State of Colorado is hereby declared to be the property of the public; and the same is dedicated to the use of the people of the State, subject to appropriation as hereinafter provided.

SEC. 6. The right to divert the unappropriated waters of any natural stream to beneficial uses shall never be denied. Priority of appropriation shall give the better right as between those using the water for the same purpose; but when the waters of any natural stream are not sufficient for the service of all those desiring the use of the same, those using the water for domestic purposes shall have the preference over those claiming for any other purpose, and those using the water for agricultural purposes shall have preference over those using the same for manufacturing purposes.

Sec. 7. All persons and corporations shall have the right of way across public, private, and corporate lands for the construction of ditches, canals, and flumes for the purpose of conveying water for domestic purposes, for the irrigation of agricultural lands, and for mining and manufacturing purposes, and for drainage, upon payment of just compensation.

Sec. 8. The general assembly shall provide by law that the board of county commissioners, in their respective counties, shall have power, when application is made to them by either party interested, to establish reasonable maximum rates to be charged for the use of water, whether furnished by individuals or corporations.

WYOMING.

In Wyoming, as in Colorado, the courts reject riparian rights and the principal of prior appropriation is established in the State. The provisions of the State constitution regarding the appropriation and use of water are as follows:

Article I.

Sec. 31. Water being essential to industrial prosperity, of limited amount, and easy of diversion from its natural channels, its control must be in the State, which, in providing for its use, shall equally guard all the varied interests involved.

Article VIII.

IRRIGATION AND WATER RIGHTS.

Sec. 1. The water of all natural streams, springs, lakes, or other collection of still water within the boundaries of the State, are hereby declared to be the property of the State.

Sec. 2. There shall be constituted a board of control, to be composed of the State engineer and superintendents of the water divisions, which shall under such regulations as may be prescribed by law, have the supervision of the waters of the State and of their appropriation, distribution, and diversion and of the various officers connected therewith. Its decisions to be subject to review by the courts of the State.

Sec. 3. Priority of appropriation for beneficial uses shall give the better right. No appropriation shall be denied except when such denial is demanded by the public interests.

Sec. 4. The legislature shall by law divide the State into four (4) water divisions and provide for the appointment of superintendents thereof.

Sec. 5. There shall be a State engineer who shall be appointed by the governor of the State and confirmed by the senate; he shall hold his office for the term of six (6) years or until his successor shall have been appointed and shall have qualified. He shall be president of the board of control and shall have general supervision of the waters of the State and of the officers connected with its distribution. No person shall be appointed to this position who has not such theoretical knowledge and such practical experience and skill as shall fit him for the position.

Article XIII.

Sec. 5. Municipal corporations shall have the same right as individuals to acquire rights by prior appropriation and otherwise to the use of water for domestic and municipal purposes, and the legislature shall provide by law for the exercise upon the part of incorporated cities, towns, and villages of the right of eminent domain for the purpose of acquiring from prior appropriators upon the payment of just compensation, such water as may be necessary for the well being thereof and for domestic uses.

MONTANA.

The following provision in the Montana State constitution relates to the use of the water in the State:

> [Art. 2, sec. 15.] The use of all water now appropriated, or that may hereafter be appropriated for sale, rental, distribution, or other beneficial use, and the right of way over the lands of others for all ditches, drains, flumes, canals, and aqueducts, necessarily used in connection therewith, as well as the sites for reservoirs necessary for collecting and storing the same, shall be held to be a public use.

NORTH DAKOTA.

The sole provision of the State constitution of North Dakota relative to the use of water is the following:

> [Art. 17, sec. 210.] All flowing streams and natural water courses shall forever remain the property of the State for mining, irrigating, and manufacturing purposes.

SOUTH DAKOTA.

This State has no constitutional provisions relative to the use of water.

NEBRASKA.

The State constitution of Nebraska makes no provision for the use of water in the State.

ADMINISTRATION OF WATER LAWS.

COLORADO.

Appropriation of water in Colorado may be divided into two general classes: The direct appropriation, where the water is used as delivered from the head gates of the canal, and the appropriation for storage, where water from the river is not used at the time of diversion but is stored in reservoirs for future use. Appropriations of the second class are usually valid only during periods of high water when there is an excess of water over the needs of the direct appropriators. In the construction of reservoirs it is necessary to obtain approval of plans by the proper county commissioners, in addition to obtaining that of the State engineer, for all dams exceeding 10 feet in height. The entire construction of the reservoir is under the supervision of the State engineer, who has authority to require material used and work of construction to be done to his satisfaction. In case of failure of a reservoir the owners are liable for all ensuing damages.

The control of water by the State is vested in the State engineer, whose duty it is to supervise the diversion of water by the various appropriators in accordance with the decrees of the State courts. The State is divided into five irrigation divisions, each in charge of a division engineer, who is under the direction of the State engineer. Each irrigation division is divided into a number of water districts, of which there are 70 for the entire State. For each water district there is appointed a water commissioner, whose duty it is, under the supervision of the division engineer, to divide the water in the natural streams among the several ditches taking water from the same, according to the rights of each. Whenever there is a scarcity of water he is empowered to shut down the head gates of those ditches whose priorities are of too recent date to entitle them to divert water. In the discharge of this duty he has the power of a constable.

WYOMING.

The constitution of the State of Wyoming creates the office of State engineer and divides the State into four principal water divisions, each under the control of a division superintendent. The State engineer and the division superintendents form a board of control having supervision of the appropriation and distribution of the water, subject to court review.

Rights to the use of water are begun by filing an application in the office of the State engineer. This application must be prepared in accordance with the State law and the requirements of the State engineer. When the application is in proper form a permit to divert the water and construct the works is issued.

The distribution of the water in accordance with the respective rights of permittees is supervised by water commissioners, one having jurisdiction in each of a large number of water districts, into which the four principal divisions are divided. The acts of the commissioners of any district are subject to review by the higher administrative officials, and eventually by the courts.

MONTANA.

An appropriation of water in Montana is begun by the posting of a notice at the proposed point of diversion, a copy of which notice is filed with the county clerk and recorder of the county in which the water is to be diverted. There is no limitation as to the amount of water upon which any person may file, and many streams have single filings upon them for more than their entire flow. Eventually, however, each appropriator can acquire the right to use only such water as he has put to beneficial use. Questions arising as to the rights of appropriators are determined by court proceedings. The State engineer has no functions relative to the diversion or distribution of water, but the State courts may appoint commissioners to enforce decrees.

Under this system examination of a stream and a search of the decrees are required to determine the title to its waters.

NORTH DAKOTA.

General supervision of matters relating to the use of water is vested in the State engineer, who is particularly charged with the custody of records and the survey of streams. The State is divided into four water divisions, each in charge of a commissioner, and each division may be further subdivided into districts, each having a water master. The water commissioners, together with the State engineer, constitute a board empowered to make general rules for the control of water.

Appropriations made prior to the present water law are adjudicated by the courts, one copy of the decree being filed in the office of the State engineer. Applications to appropriate water are filed with the State engineer, the procedure therefor being similar to that in Wyoming.

NEBRASKA.

Control of water for irrigation is vested in the State board of irrigation, highways, and drainage, which consists of the governor, attorney general, and commissioner of public lands. The State engineer is appointed by the board, and acts as its secretary. The State is divided into two water divisions, each in charge of a superintendent. Within these divisions water districts, in charge of water commissioners, may be created as needed. The water commissioners control the distribution of water to the respective appropriators.

Applications to appropriate water for irrigation are made to the State board in accordance with the regulations. Upon approval the applicant may construct the necessary works. A certificate is finally issued by the State board and recorded with the county clerk.

Storage reservoirs are subject to special provisions of law, and dams over 10 feet high must be authorized by the board.

IRRIGATION DISTRICTS.

With the growth of irrigation in Colorado it has become necessary to enact laws creating irrigation districts whereby the owners of adjacent lands may organize for the purpose of jointly conveying water to irrigate these lands. When a majority of landowners in a district desire to irrigate their lands, they may petition the county commissioners of the county in which the greatest acreage of land is located to organize an irrigation district. An election is then held by the commissioners at which all the landowners in the proposed district are entitled to vote on the question of organization. If the result of the election favors it, the irrigation district is organized and a board of three directors elected. This board is empowered to enter into contracts for completing the necessary structures to irrigate the lands, and to acquire rights of way, water rights, etc. Similar statutes have been enacted in Wyoming, Montana, and Nebraska.

THE CAREY ACT.

The act of August 18, 1894 (28 Stat., 372, 422), commonly known as the Carey Act, and amendments thereto, the purpose of which is to aid the public-land States in the reclamation of the desert lands therein and in the settlement, cultivation, and sale of such lands in small tracts to actual settlers, authorize—

(*a*) The temporary withdrawal of public lands from settlement or entry pending investigation and survey preliminary to the filing of an application for segregation, such withdrawn lands to be restored to settlement and entry at the end of one year from the date of withdrawal in case application for segregation is not theretofore made.

(*b*) The segregation of public lands by the Secretary of the Interior, contracts between the United States and any beneficiary State, and the reclamation of such lands by beneficiary States within 10 years from the approval of the State's application (subject to an extension of five years).

(*c*) The patenting to any beneficiary State of any tract of reclaimed land when satisfactory proof is made that an ample supply of water to reclaim it is actually furnished.

The usual procedure under the Carey Act is about as follows:

A corporation or individual applies to the State for the withdrawal of certain public lands proposed for irrigation. The State thereupon submits to the Interior Department an application for their withdrawal. On the approval of this application the State is allowed one year in which to investigate the project and prepare satisfactory plans for reclamation. The proposing company conducts the investigation and, if a project that is considered feasible is developed, makes application to the State for the segregation of the irrigable lands and offers to contract with the State for their reclamation. The State thereupon applies to the Interior Department for the segregation of the lands under the terms of the Carey Act and its amendments. If the plan of irrigation is found to be feasible, the irrigation company responsible, and the available water supply adequate, the lands are segregated and the contract for their reclamation is entered into between the United States and the State. When the irrigation works are completed to the satisfaction of the Government, patent is issued to the State or to its assigns. The State receives payment for the lands from the settler, and the irrigation company, either directly or through the State, receives payment from each settler for his proportionate share of the irrigation works and water rights involved.

The Tenth General Assembly of Colorado, by an act approved March 15, 1895, accepted the conditions and grants of land to the State under the provisions of the Carey Act. The subsequent State laws stipulate that the selection, management, and disposal of such lands shall be vested in the State board of land commissioners. Before a project is approved the engineering features must be passed upon by the State engineer. Similar statutes have been enacted by Wyoming and Montana.

GAGING STATION RECORDS.

MISSOURI RIVER PROPER.

RED ROCK RIVER ABOVE RED ROCK RESERVOIR, NEAR MONIDA, MONT.

Location.—At wagon bridge on Lyon's ranch, 18 miles east of Monida, and about 12 miles above the dam of the Red Rock Reservoir & Irrigation Co.

Records available.—Four miscellaneous measurements in 1910; May to October, 1911.

Drainage area.—Not measured.

Gage.—Staff gage nailed to piling on downstream side of bridge.

Channel.—Very liable to change. The stream is very sluggish, sediment is apt to accumulate, and weeds grow on the bed.

Discharge measurements.—Made from the downstream side of bridge at high water; by wading above the bridge at low water.

Winter flow.—May be affected by ice from November till the ice breaks up in the spring.

Artificial control.—Little or none above the station.

Accuracy.—Fair. The shifting channel affects the results.

Discharge measurements of Red Rock River above Red Rock reservoir, near Monida, Mont., in 1910–11.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
1910.		*Feet.*	*Sec.-ft.*	1911.		*Feet.*	*Sec.-ft.*
July 6	Lamb and Wade	2.50	38	Apr. 24	C. S. Heidel	4.78	445
19	C. S. Heidel	2.52	38	July 11	.....do	3.31	139
30	.....do	2.42	34	Sept. 20	.....do	3.10	89

Daily gage height, in feet, of Red Rock River above Red Rock reservoir, near Monida, Mont., for 1911.

[Mark Lyons, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	4.4	4.2	3.0	2.9	3.45	3.5
2	....	4.8	4.0	3.05	2.85	3.4	3.5
3	....	4.9	3.5	3.1	3.0	3.4	....
4	....	4.9	3.6	3.1	3.05	3.4	3.5
5	....	4.9	3.6	3.2	3.05	....	....
6	....	4.8	3.5	3.2	3.1	3.4	....
7	5.5	4.8	3.5	3.1	....	3.45	....
8	5.4	4.7	3.4	3.0	....	3.45	....
9	5.3	4.8	3.3	3.1	....	3.4	....
10	5.2	4.7	3.3	3.0	....	....	....
11	5.0	4.8	3.3	3.0	....	3.3	....
12	5.2	4.8	3.3	3.0	3.2	....	....
13	5.2	4.8	3.3	3.1	3.2	....	....
14	5.1	4.7	3.25	3.0	3.1	3.5	....
15	5.0	4.7	3.2	3.0	3.1	3.5	....
16	4.9	4.6	3.2	3.0	3.1	3.45	....
17	4.8	4.6	3.2	3.1	3.1	3.4	....
18	4.5	4.45	3.2	3.0	3.1	3.4	....
19	4.3	4.35	3.1	2.9	3.1	3.4	....
20	4.3	4.3	3.05	2.9	3.1	3.4	....
21	4.3	4.25	3.0	2.85	3.1	3.4	....
22	4.3	4.2	3.0	2.85	3.1	3.4	....
23	4.45	4.1	3.0	2.8	3.1	3.4	....
24	4.6	4.0	3.0	2.8	3.1	....	....
25	4.6	3.9	3.05	2.85	3.2	3.5	....
26	4.9	3.7	3.2	2.8	3.2	....	....
27	4.8	3.65	3.1	2.85	3.2	3.5	....
28	4.5	3.8	3.1	2.9	3.1	3.7	....
29	4.5	3.8	3.0	2.9	3.1	3.7	....
30	4.4	4.1	3.0	2.85	3.1	....	....
31	4.3	....	3.0	2.85	....	....	....

NOTE.—Ice present after Oct. 23.

Daily discharge, in second-feet, of Red Rock River above Red Rock reservoir, near Monida, Mont., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	500	345	295	85	75	148
2	500	445	255	90	70	140
3	550	470	155	95	85	140
4	550	470	175	95	90	140
5	600	470	175	110	90	140
6	600	445	155	110	95	140
7	650	445	155	95	98	148
8	620	420	140	85	100	148
9	590	445	125	95	102	140
10	560	420	125	85	105	132
11	500	445	125	85	108	125
12	560	445	125	85	110	135
13	560	445	125	95	110	145
14	530	420	118	85	95	155
15	500	420	110	85	95	155
16	470	395	110	85	95	148
17	445	395	110	95	95	140
18	370	358	110	85	95	140
19	320	332	95	75	95	140
20	320	320	90	75	95	140
21	320	308	85	70	95	140
22	320	295	85	70	95	140
23	358	275	85	65	95	140
24	395	255	85	65	95	130
25	395	235	90	70	110	130
26	470	195	110	65	110	130
27	445	185	95	70	110	130
28	370	215	95	75	95	130
29	370	215	85	75	95	130
30	345	275	85	70	95	130
31	320	....	85	70	....	130

NOTE.—Daily discharge determined from a fairly well-defined discharge rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Red Rock River above Red Rock reservoir, near Monida, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	650	320	465	28,600	B.
June	470	185	360	21,400	B.
July	295	85	124	7,620	B.
August	110	65	82.6	5,080	B.
September	110	70	96.6	5,750	B.
October	155	125	139	8,550	B.
The period	....	....	....	77,000	

RED ROCK RIVER BELOW RED ROCK RESERVOIR, NEAR MONIDA, MONT.

Location.—Just below the reservoir of the Red Rock Reservoir & Irrigation Co., 8 miles northeast of Monida and 15 miles east of Lima.

Records available.—July 22, 1911, to November 30, 1911. Miscellaneous measurements were made at this point on Red Rock River during the summer of 1910.

Drainage area.—About 560 square miles.

Gages.—A temporary staff gage about 300 yards downstream from the dam and a float gage in a concrete well on the right bank, at a 40-foot weir, about halfway between the dam and the staff gage. The 1911 records are referred to the staff gage.

Channel.—Probably permanent; bed of stream composed of coarse gravel, pebbles, and bowlders; current strong.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Regulation.—The dam is used to store flood waters which are released during the latter part of the irrigation season.

Accuracy.—Both staff gage and weir readings should be reliable.

Discharge measurements of Red Rock River below Red Rock reservoir, near Monida, Mont., 1910-11.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
1910.		*Feet.*	*Sec.-ft.*	1911.		*Feet.*	*Sec.-ft.*
July 7[a]	Lamb and Wade	2.20	36	July 11	C. S. Heidel	3.10	188
7[a]	do	2.10	29	12	do	[b]3.03	152
7[a]	do	2.49	65	Sept. 20	do	[c]2.74	102
7[a]	do	2.85	127				
7[a]	do	1.80	13.1				
19	C. S. Heidel	2.43	65				
30	do	2.35	58				

[a] Measurement made 1,000 feet below dam. [b] Weir gage read 1.04 feet. [c] Weir gage read .81 feet.

Daily gage height, in feet, and discharge, in second-feet, of Red Rock River below Red Rock reservoir, near Monida, Mont., for 1911.

[P. V. Maxwell, observer.]

Day.	July.		Aug.		Sept.		Oct.		Nov.	
	Gage height.	Discharge.	Gage height.	Dis. charge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	....	....	2.62	86	2.50	69	2.72	101	2.90	135
2	....	....	2.61	84	2.50	69	2.72	101	3.05	165
3	....	....	2.60	83	2.50	69	2.71	100	3.15	188
4	....	....	2.60	83	2.50	69	2.71	100	3.25	212
5	....	....	2.66	92	2.60	83	2.71	100	3.30	225
6	....	....	2.68	95	2.60	83	2.71	100	3.35	238
7	....	....	2.68	95	2.67	94	2.71	100	3.35	238
8	....	....	2.71	100	2.74	105	2.71	100	3.40	250
9	....	....	2.74	105	2.74	105	2.71	100	3.50	280
10	....	....	2.74	105	2.74	105	2.71	100	3.50	280
11	....	....	2.73	103	2.74	105	2.72	101	3.50	280
12	....	....	2.68	95	2.72	101	2.71	100	3.50	280
13	....	....	2.62	86	2.72	101	2.71	100	3.50	280
14	....	....	2.54	75	2.72	101	2.71	100	3.50	280
15	....	....	2.46	64	2.72	101	....	140	3.15	188
16	....	....	2.46	64	2.72	101	....	180	2.84	123
17	....	....	2.45	63	2.72	101	....	220	2.84	123
18	....	....	2.45	63	2.72	101	....	260	2.84	123
19	....	....	2.46	64	2.72	101	....	300	2.84	123
20	....	....	2.47	65	2.72	101	....	340	2.84	123
21	....	....	2.50	69	2.72	101	....	380	2.84	123
22	....	....	2.50	69	2.72	101	3.90	415	2.84	123
23	2.68	95	2.50	69	2.72	101	3.95	432	2.84	123
24	2.67	94	2.50	69	2.72	101	4.00	450	2.84	123
25	2.67	94	2.50	69	2.72	101	3.95	432	2.84	123
26	2.67	94	2.50	69	2.72	101	3.90	415	2.84	123
27	2.63	88	2.50	69	2.72	101	3.90	415	2.84	123
28	2.63	88	2.50	69	2.72	101	3.40	250	2.84	123
29	2.63	88	2.50	69	2.72	101	2.89	133	2.84	123
30	2.63	88	2.50	69	2.72	101	2.84	123	2.84	123
31	2.63	88	2.50	69	....	....	2.80	115	....	....

NOTE.—Gage heights refer to staff gage. Discharge determined from a very well-defined rating curve. Discharge interpolated Oct. 15 to 21.

Monthly discharge of Red Rock River below Red Rock reservoir, near Monida, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July 23-31	95	88	90.8	1,620	A.
August	105	63	78.4	4,820	A.
September	105	69	95.8	5,700	A.
October	450	100	207	12,700	A.
November	280	123	179	10,700	A.

RED ROCK RIVER AT LIMA, MONT.

Location.—Near the Gleed ranch, 1 mile east of Lima, Mont. Principal tributaries below the station, Sheep and Sage creeks.

Records available.—August 14, 1907, to September 30, 1911.

Drainage area.—Not measured.

Gage.—Chain; installed October 27, 1908, at a point just above the cable and 300 feet farther downstream than the old staff gage which it replaced; datum of chain gage not the same as that of the staff gage.

Channel.—Probably permanent.

Discharge measurements.—At ordinary and high-water stages made from a cable below the gage; at extremely low stages measurements made by wading just below the cable section.

Winter flow.—River generally remains open the entire year, as a large spring discharges into the stream just above the gage.

Diversions.—Three ditches, each carrying approximately 900 miner's inches, take water from Red Rock above the station. The flow of water above the station is all appropriated, but the rights are unadjudicated.

Storage.—The dam of the reservoir storing the water of the Red Rock has been completed, but no canals have been built. The dam is of earth with concrete core, is 50 feet high, and will impound 90,000 acre-feet; its top elevation is 6,700 feet; the dam is 16 miles above Lima, Mont., and 27 miles below lower Red Rock Lake.

Accuracy.—In general, the results obtained at this station should be good.

Discharge measurements of Red Rock River at Lima, Mont., 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 25	C. S. Heidel	0.55	18
July 13	do	1.88	191
Sept. 22	do	1.52	122

Daily gage height, in feet, of Red Rock River at Lima, Mont., for 1911.

[Alice Gleed, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.55	1.00	0.50	0.55	2.15	3.05	2.10	1.15	1.30
2	.55	1.60	.50	.55	2.25	2.80	2.10	1.15	1.35
3	.50	1.10	.50	.55	2.25	2.80	2.10	1.15	1.30
4	.50	1.60	.50	.55	2.25	2.80	2.00	1.15	1.35
5	.45	1.05	.45	.50	2.30	2.80	1.90	1.15	1.25
6	.50	1.10	.50	.55	2.30	2.75	1.90	1.15	1.35
7	.50	1.20	.50	.55	2.60	2.80	1.95	1.15	1.30
8	.50	.70	.55	1.05	2.95	2.80	1.95	1.15	1.35
9	.55	.60	.50	1.10	2.85	2.85	2.00	1.20	1.30
10	.50	.55	.45	.75	2.85	2.85	2.05	1.20	1.40
11	.50	.60	.50	.65	2.85	2.85	2.00	1.20	1.40
12	.50	.60	.50	.65	2.90	2.75	2.05	1.20	1.45
13	.50	.60	.50	.65	2.90	2.65	2.05	1.20	1.45
14	.50	.60	.50	.65	2.90	2.65	2.00	1.20	1.55
15	.45	.50	.45	.60	2.95	2.70	2.05	1.10	1.60
16	.55	.55	.50	.60	2.95	2.70	2.05	1.10	1.65
17	.55	.55	.55	.60	2.95	2.70	1.40	1.05	1.70
18	.50	.55	.55	.60	2.95	2.75	1.40	1.05	1.75
19	.50	.55	.55	.65	2.95	2.80	1.30	1.05	1.70
20	.45	.50	.50	.55	2.95	2.80	1.30	1.05	1.70
21	.50	.55	.55	.60	2.90	2.85	1.30	1.05	1.70
22	.50	.55	.55	.70	2.95	2.90	1.30	1.05	1.75
23	.50	.55	.55	.65	2.95	2.85	1.15	1.05	1.50
24	.50	.55	.55	.60	2.90	2.85	1.20	1.05	1.55
25	.45	.50	.50	.50	2.95	2.85	1.20	1 05	1 40
26	.50	.50	.55	1.30	2.85	2.00	1.20	1.05	1.50
27	50	.50	.55	1.40	2.85	2.00	1.05	1.25	1.30
28	.50	.50	.55	1.50	2.95	2.05	1.20	1.35	1.35
29	.50	....	.55	1.60	3.05	2.05	1.20	1.30	1.30
30	.45	....	.50	1.90	3.1	2.15	1.20	1.30	1.30
31	.50	....	.55	....	3.05	....	1.15	1.30	....

NOTE.—Ice present Feb. 1 to 8.

Daily discharge, in second-feet, of Red Rock River at Lima, Mont., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18	17	16	18	250	510	237	66	85
2	18	17	16	18	276	432	237	66	92
3	16	18	16	18	276	432	237	66	85
4	16	18	16	18	276	432	213	66	92
5	14	19	14	16	289	432	191	66	78
6	16	19	16	18	289	417	191	66	92
7	16	20	16	18	372	432	202	66	85
8	16	20	18	54	478	432	202	66	92
9	18	21	16	60	448	448	213	72	85
10	16	18	14	30	448	448	225	72	99
11	16	21	16	24	448	448	213	72	99
12	16	21	16	24	463	417	225	72	106
13	16	21	16	24	463	387	225	72	106
14	16	21	16	24	463	387	213	72	122
15	14	16	14	21	478	402	225	60	131
16	18	18	16	21	478	402	225	60	140
17	18	18	18	21	478	402	99	54	150
18	16	18	18	21	478	417	99	54	160
19	16	18	18	24	478	432	85	54	150
20	14	16	16	18	478	432	85	54	150
21	16	18	18	21	463	448	85	54	150
22	16	18	18	26	478	463	85	54	160
23	16	18	18	24	478	448	66	54	114
24	16	18	18	21	463	448	72	54	122
25	14	16	16	16	478	448	72	54	99
26	16	16	18	85	448	213	72	54	114
27	16	16	18	99	448	213	54	78	85
28	16	16	18	114	478	225	72	92	92
29	16	....	18	131	510	225	72	85	85
30	14	....	16	191	525	250	72	85	85
31	16	....	18	....	510	....	66	85	....

Monthly discharge of Red Rock River at Lima, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	18	14	16	984	B.
February	21	16	18.2	1,010	B.
March	18	14	16.6	1,020	B.
April	191	16	40.6	2,420	B.
May	525	250	432	26,600	B.
June	510	213	397	23,600	B.
July	237	54	149	9,160	B.
August	92	54	66	4,060	B.
September	160	78	110	6,550	B.
The period				75,400	

BEAVERHEAD RIVER AT BARRATTS, MONT.

Location.—One mile above Barratts and 2 miles southwest of Dillon, Mont., in the SW. ¼ SW. ¼ sec. 20, T. 8 S., R. 9 W.

Records available.—August 12, 1907, to December 31, 1911.

Drainage area.—Not measured.

Gage.—A standard chain gage was installed on the downstream side of the bridge June 22, 1908, to replace the ordinary staff gage which had previously been used; datum of chain gage the same as that of the staff gage.

Channel.—Should not shift; rocky at the measuring section.

Discharge measurements.—Made from downstream side of the bridge.

Winter flow.—Stream remains open during the winter months.

Diversions.—Innumerable diversions are made above the station. Decreed water rights, aggregating 85,866 inches of water, are filed on from Lima on Red Rock River to a point 10 miles above Twin Bridges. The three largest canals diverted below the station are Canyon Creek canal, appropriating 6,000 inches; Union canal, appropriating 4,000 inches; and Beaverhead canal, diverted just north of Dillon, appropriating 5,000 inches. The Union Electric Co., of Dillon, has a canal with a carrying capacity of 6,000 inches.

Beaverhead River is called Red Rock River from its source in Red Rock Lakes to the post office of Red Rock, below which it is called the Beaverhead. The principal tributaries to the Beaverhead above the station are Grasshopper Creek, 12 miles south of Dillon; Horse Prairie Creek, 20 miles south; and Rattlesnake and Blacktail Deer creeks. Irrigation has probably been practiced in Beaverhead Valley longer than in any other valley in Montana, ditches constructed in the early seventies being still in operation.

Discharge measurements of Beaverhead River at Barratts, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 22	C. S. Heidel	1.26	416
July 10	.....do	1.02	291
Sept. 19	.....do	.78	214

Daily gage height, in feet, of Beaverhead River at Barratts for 1911.

[W. A. Meeds, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1.60	1.20	1.50	1.90	0.78	0.69	0.85	1.60
2	....	1.55	1.20	1.90	1.90	.81	.67	.92	1.50
3	....	1.45	1.20	2.00	1.60	.94	.70	.91	1.50
4	....	1.30	1.20	1.90	1.40	1.10	.80	.84	1.50
5	....	1.20	1.15	1.95	1.25	1.05	.81	.88	1.60
6	....	1.05	1.15	2.00	1.20	1.05	.90	.90	1.70
7	....	1.05	1.20	1.90	1.10	.98	.86	.91	1.70
8	....	1.00	1.25	2.20	1.05	.88	.90	.90	1.70
9	....	1.05	1.25	2.20	1.05	.87	.85	.98	1.60
10	....	1.20	1.10	2.20	1.05	.87	.85	1.05	1.70
11	....	1.10	1.10	1.85	.97	.86	.75	1.25	1.70
12	0.86	1.05	1.00	1.95	.87	.86	.80	1.25	1.60
13	.88	.88	1.00	1.90	.85	.82	.90	1.30	1.60
14	.88	.86	1.05	2.10	.79	.80	.90	1.30	1.70
15	.88	.91	1.20	2.20	.86	.80	.80	1.30	....
16	.87	.96	1.40	2.20	.79	.76	.80	1.25	....
17	.96	1.00	1.40	2.10	.83	.77	.80	1.25	....
18	1.05	.96	1.30	1.95	.82	.77	.75	1.25	....
19	1.10	1.06	1.20	1.95	.79	.78	.80	1.30	....
20	1.15	1.10	1.20	2.50	.77	.75	.81	1.35	....
21	1.30	1.15	1.10	2.70	.77	.76	.80	1.40	....
22	1.30	1.20	1.15	2.40	.77	.75	.75	1.50	....
23	1.30	1.20	1.20	1.90	.82	.74	.80	1.65	....
24	1.45	1.20	1.45	1.65	.81	.74	.84	1.75	....
25	1.35	1.16	1.60	1.55	.78	.71	.81	1.85	....
26	1.15	1.20	1.80	1.35	.79	.71	.80	1.90	....
27	1.10	1.30	1.85	1.30	.79	.71	.80	1.90	....
28	1.05	1.45	1.80	1.40	.79	.67	.84	1.75	....
29	1.10	1.40	1.65	1.45	.79	.66	.85	1.60	....
30	1.30	1.30	1.50	1.75	.81	.66	.85	1.50	....
31	1.45	....	1.45	....	.79	.67	....	1.50	....

Daily discharge, in second-feet, of Beaverhead River at Barratts for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	200	595	385	540	770	213	182	238	595
2	204	568	385	770	770	224	174	263	540
3	208	512	385	835	595	271	185	259	540
4	212	435	385	770	485	340	220	234	540
5	216	385	362	802	410	318	224	248	595
6	220	318	362	835	385	318	255	255	650
7	224	318	385	770	340	287	241	259	650
8	228	295	410	965	318	248	255	275	650
9	232	318	410	965	318	245	238	287	595
10	235	385	340	965	318	245	238	318	650
11	238	340	340	740	283	241	202	410	650
12	241	318	295	802	245	241	220	410	595
13	248	248	295	770	238	227	255	435	595
14	248	241	318	900	216	220	255	435	650
15	248	259	385	965	238	220	220	435	630
16	244	279	485	965	216	206	220	410	610
17	279	295	485	900	230	210	220	410	440
18	318	279	435	802	227	210	202	410	433
19	340	318	385	802	216	213	220	435	426
20	362	340	385	1,170	210	202	224	460	419
21	435	362	340	1,310	210	206	220	485	412
22	435	385	362	1,100	210	202	202	540	405
23	435	385	385	770	227	199	220	623	398
24	512	385	512	622	224	199	234	680	391
25	460	362	595	568	213	188	224	740	384
26	362	385	710	460	216	188	220	770	377
27	340	435	740	435	216	188	220	770	370
28	318	512	710	485	216	174	234	680	363
29	340	485	622	512	216	171	238	595	356
30	435	435	540	680	224	171	238	540	350
31	512	....	512	....	216	174	....	540	....

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge estimated Mar. 1 to 11 and Nov. 15 to 30.

Monthly discharge of Beaverhead River at Barratts, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a] 250	15,400	D.
February	....	....	[a] 200	11,100	D.
March	512	200	300	18,400	C.
April	595	241	373	22,200	B.
May	740	295	440	27,100	B.
June	1,310	435	799	47,500	B.
July	770	210	304	18,700	B.
August	340	171	224	13,800	B.
September	255	174	223	13,300	B.
October	770	234	447	27,500	B.
November	650	350	509	30,300	C.
December	....	....	[a] 350	21,500	D.
The year	1,310	....	368	267,000	

[a] Estimated.

JEFFERSON RIVER NEAR SILVERSTAR, MONT.

Location.—In sec. 23, T. 2 S., R. 6 W., at the big highway bridge on the road from Silverstar to Iron Rod, a station on a branch of the Northern Pacific Railway. The principal tributaries below the station are Pipestone and Whitetail creeks and Boulder River.

Records available.—August 11 to December 31, 1910; May 1 to October 31, 1911.

Drainage area.—Not measured.

Gage.—Standard staff gage fastened to pier on downstream side.

Channel.—Gravel.

Discharge measurements.—Made from the lower side of highway bridge.

Winter flow.—Ice present.

Diversions.—Irrigation is carried on extensively from the headwaters of this stream to its mouth.

Discharge measurements of Jefferson River near Silverstar, Mont., 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 26	C. S. Heidel	3.53	2,560
June 14	.....do	6.20	8,710
July 7	.....do	2.94	1,510
Sept. 14	.....do	2.60	920

Daily gage height, in feet, of Jefferson River near Silverstar, Mont., for 1911.

[C. A. Barkell, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	3.60	3.75	....	2.20	2.30	2.55	3.20
2	....	3.50	3.90	4.0	2.10	2.30	2.60	3.20
3	....	3.45	4.7	3.90	1.95	2.30	2.60	3.15
4	....	3.50	5.0	3.70	2.00	2.30	2.55	3.10
5	....	3.55	5.3	3.50	2.10	2.35	2.55	3.15
6	....	3.60	5.8	3.45	2.30	2.51	2.50	3.15
7	....	3.70	5.8	3.30	2.20	2.55	2.50	3.20
8	....	3.75	5.9	3.30	2.20	2.60	2.55	3.20
9	....	3.80	6.1	3.25	2.25	2.70	2.60	....
10	....	3.80	6.2	3.15	2.30	2.70	2.65	....

Daily gage height, in feet, of Jefferson River near Silverstar, Mont., for 1911—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11	....	3.75	6.2	3.10	2.30	2.65	2.70	....
12	....	3.60	6.2	3.00	2.35	2.60	2.70	....
13	....	3.60	6.2	3.00	2.40	2.55	2.75	....
14	....	3.65	6.2	2.90	2.40	2.40	2.80	....
15	....	3.80	6.3	2.80	2.35	2.40	2.80	....
16	....	3.90	6.4	2.75	2.30	2.32	2.85	....
17	....	3.90	6.3	2.75	2.30	2.30	2.90	....
18	....	3.90	6.2	2.75	2.30	2.30	2.90	....
19	....	4.0	6.0	2.70	2.25	2.32	2.95	....
20	....	3.90	6.0	2.70	2.20	2.35	3.00	....
21	....	3.80	5.9	2,65	2.20	2.40	3.00	....
22	....	3.70	5.6	2.65	2.20	2.40	3.05	....
23	....	3.70	5.4	2.60	2.15	2.35	3.00	....
24	....	3.60	5.2	2.50	2.10	2.40	3.00	....
25	....	3.60	5.0	2.45	2.10	2.40	3.00	....
26	....	3.65	4.9	2.40	2.10	2.45	3.00	....
27	3.60	3.70	4.6	2.40	2.15	2.50	3.00	....
28	3.70	3.70	4.5	2.20	2.20	2.50	3.10	....
29	3.80	3.70	4.2	2.20	2.20	2.50	3.20	....
30	3.80	3.70	4.1	2.20	2.25	2.50	3.20	....
31	....	3.60	....	2.20	2.30	....	3.25	....

NOTE.—Gage heights distorted by ice after Oct. 27.

Daily discharge, in second-feet, of Jefferson River near Silverstar, Mont., for 1911.

[C. A. Barkell, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	2,500	2,790	3,400	620	710	955
2	....	2,320	3,090	3,300	540	710	1,010
3	....	2,240	4,870	3,090	440	710	1,010
4	....	2,320	5,600	2,690	470	710	955
5	....	2,410	6,360	2,320	540	755	955
6	....	2,500	7,660	2,240	710	911	900
7	....	2,690	7,660	1,980	620	955	900
8	....	2,790	7,930	1,980	620	1,010	955
9	....	2,890	8,470	1,900	665	1,120	1,010
10	....	2,890	8,740	1,740	710	1,120	1,060
11	....	2,790	8,740	1,660	710	1,060	1,120
12	....	2,500	8,740	1,510	755	1,010	1,120
13	....	2,500	8,740	1,510	800	955	1,180
14	....	2,600	8,740	1,370	800	800	1,240
15	....	2,890	9,010	1,240	755	800	1,240
16	....	3,090	9,280	1,180	710	728	1,300
17	....	3,090	9,010	1,180	710	710	1,370
18	....	3,090	8,740	1,180	710	710	1,370
19	....	3,300	8,200	1,120	665	728	1,440
20	....	3,090	8,200	1,120	620	755	1,510
21	....	2,890	7,930	1,060	620	800	1,510
22	....	2,690	7,140	1,060	620	800	1,580
23	....	2,690	6,620	1,010	580	755	1,510
24	....	2,500	6,100	900	540	800	1,510
25	....	2,500	5,600	850	540	800	1,510
26	....	2,600	5,350	800	540	850	1,510
27	2,500	2,690	4,630	800	580	900	1.510
28	2,690	2,690	4,400	620	620	900	1,500
29	2,890	2,690	3,730	620	620	900	1,500
30	2,890	2,690	3,510	620	665	900	1,500
31	....	2,500	....	620	710	....	1,500

Monthly discharge of Jefferson River near Silverstar, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	3,300	2,240	2,700	166,000	B.
June	9,280	2,790	6,850	408,000	B.
July	3,400	620	1,510	92,800	B.
August	800	440	639	39,300	B.
September	1,120	710	846	50,300	B.
October	1,580	900	1,270	78,100	B.
The period				835,000	

MISSOURI RIVER AT TOSTON, MONT.

Location.—In SW. ¼ sec. 23, T. 5 N., R. 2 E., at the highway bridge crossing Missouri River at Toston, Mont.; about 25 miles below the union of Gallatin, Jefferson, and Madison rivers.

Records available.—April 5, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to downstream side of bridge.

Channel.—Rocky and permanent.

Discharge measurements.—Made from cable just above bridge.

Winter flow.—Affected by ice only in extremely cold weather.

The only important tributary between the gaging station and the headwater forks is Sixteenmile Creek.

Discharge measurements of Missouri River at Toston, Mont., 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 12	B. E. Jones	4.05	4,760
June 19	.....do	7.85	21,900
July 17	.....do	3.82	3,750
Aug. 18	.....do	3.48	3,220

Daily gage height, in feet, of Missouri River at Toston, Mont., for 1911.

[W. B. Lorentz, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.05	7.7	6.2	3.90	4.4	5.2	5.4	3.20	2.95	3.45	3.65	3.50
2	2.75	7.5	6.6	4.1	4.4	5.8	5.4	3.15	2.95	3.45	3.60	3.45
3	3.00	7.2	6.5	4.1	4.2	6.6	5.2	3.10	3.00	3.45	3.65	3.40
4	3.65	7.2	6.4	4.1	4.2	6.8	....	3.15	3.10	3.55	3.70	3.50
5	3.35	7.6	6.1	4.3	4.3	7.6	5.0	3.20	3.00	3.60	3.70	3.45
6	3.25	7.4	5.2	4.3	4.4	7.7	5.0	3.35	2.95	3.55	3.85	3.50
7	3.30	7.5	4.6	4.3	4.6	7.8	4.9	3.40	3.15	3.55	3.75	3.50
8	3.35	6.6	5.0	4.2	4.8	7.8	4.8	3.40	3.40	3.55	3.65	3.45
9	3.35	5.5	4.4	4.1	4.9	8.0	4.7	3.35	3.45	3.55	3.70	3.50
10	3.25	5.4	4.0	4.0	5.0	8.0	4.6	3.25	3.45	3.60	3.15	3.45
11	3.30	5.0	4.3	4.0	4.9	8.0	4.4	3.35	3.45	3.55	3.00	3.55
12	2.90	4.1	4.0	4.05	4.8	8.0	4.1	3.40	3.45	3.55	2.85	3.45
13	5.2	4.2	3.85	4.0	4.6	8.2	3.8	3.35	3.40	3.55	3.05	3.45
14	8.8	4.2	3.90	3.95	4.6	8.2	3.85	3.60	3.45	3.65	3.80	3.50
15	9.0	4.2	3.90	3.80	4.6	8.4	3.80	3.65	3.45	3.80	3.75	3.45
16	8.9	4.0	4.0	3.80	4.8	8.4	3.70	3.60	3.45	3.70	3.70	3.45
17	8.9	3.95	4.1	3.80	5.0	8.2	3.75	3.60	3.45	3.65	3.65	3.55
18	8.8	3.85	3.95	3.85	5.1	8.0	3.55	3.55	3.50	3.65	3.85	3.50
19	9.0	4.0	3.90	3.80	5.0	7.8	3.50	3.50	3.45	3.65	4.0	3.30
20	8.7	3.80	3.95	3.90	5.0	7.6	3.50	3.15	3.45	3.75	3.90	3.25

Daily gage height, in feet, of Missouri River at Toston, Mont., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	8.5	3.80	4.0	3.90	5.0	7.6	3.50	2.95	3.35	3.70	3.75	3.35
22	8.5	4.4	4.0	3.95	4.8	7.6	3.45	2.95	3.45	3.65	3.85	3.40
23	8.5	5.4	4.1	4.0	4.7	7.3	3.45	2.95	3.45	3.65	3.85	3.45
24	8.3	7.4	4.1	4.2	4.8	7.0	3.50	3.05	3.40	3.70	3.80	3.55
25	7.8	5.4	4.1	4.2	5.0	6.8	3.35	2.95	3.35	3.80	3.65	3.15
26	7.8	7.5	4.1	4.1	5.4	6.2	3.25	3.00	3.45	3.75	3.60	3.05
27	7.8	6.4	3.90	4.0	5.4	5.9	3.20	2.95	3.40	3.70	3.55	2.95
28	7.6	7.0	3.90	4.2	5.4	5.6	3.20	2.95	3.50	3.60	3.50	2.90
29	7.6	....	3.90	4.5	5.4	5.4	3.15	3.00	3.45	3.65	3.55	2.65
30	7.5	....	3.80	4.5	5.2	5.4	3.05	3.00	3.45	3.70	3.55	6.3
31	7.4	....	3.80	....	5.3	....	3.10	3.00	....	3.65	....	7.6

NOTE.—Gage heights Jan. 1 to Mar. 12 and Dec. 30 to 31 distorted by ice.

Daily discharge, in second-feet, of Missouri River at Toston, Mont., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,180	3,860	2,480	4,250	5,940	9,130	9,990	2,360	1,820	2,980	3,520	3,110
2	1,570	3,900	2,400	4,890	5,940	11,700	9,990	2,240	1,820	2,980	3,380	2,980
3	1,340	3,940	2,710	4,890	5,230	15,400	9,130	2,130	1,920	2,980	3,520	2,850
4	1,180	3,670	2,680	4,890	5,230	16,400	8,720	2,240	2,130	3,240	3,660	3,110
5	2,840	3,480	2,960	5,580	5,580	20,500	8,300	2,360	1,920	3,380	3,660	2,980
6	2,980	3,280	3,360	5,580	5,940	21,100	8,300	2,720	1,820	3,240	4,100	3,110
7	2,950	3,220	3,980	5,580	6,690	21,600	7,890	2,850	2,240	3,240	3,800	3,110
8	2,740	3,280	4,630	5,230	7,480	21,600	7,480	2,850	2,850	3,240	3,520	2,980
9	3,230	3,090	5,240	4,890	7,890	22,700	7,080	2,720	2,980	3,240	3,660	3,110
10	2,970	3,260	4,740	4,560	8,300	22,700	6,690	2,480	2,980	3,380	2,240	2,980
11	2,400	3,330	4,650	4,560	7,890	22,700	5,940	2,720	2,980	3,240	1,920	3,240
12	2,120	3,430	5,560	4,720	7,480	22,700	4,890	2,850	2,980	3,240	1,640	2,980
13	1,720	3,280	4,100	4,560	6,690	23,800	3,950	2,720	2,850	3,240	2,020	2,980
14	1,620	3,050	4,250	4,400	6,690	23,800	4,100	3,380	2,980	3,520	3,950	3,110
15	1,590	3,350	4,250	3,950	6,690	24,900	3,950	3,520	2,980	3,950	3,800	2,980
16	1,800	3,210	4,560	3,950	7,480	24,900	3,660	3,380	2,980	3,660	3,660	2,980
17	2,170	2,970	4,890	3,950	8,300	23,800	3,800	3,380	2,980	3,520	3,520	3,240
18	2,160	2,800	4,400	4,100	8,710	22,700	3,240	3,240	3,110	3,520	4,100	3,110
19	2,400	2,890	4,250	3,950	8,300	21,600	3,110	3,110	2,980	3,520	4,560	2,600
20	2,820	2,830	4,400	4,250	8,300	20,500	3,110	2,240	2,980	3,800	4,250	2,480
21	3,110	2,590	4,560	4,250	8,300	20,500	3,110	1,820	2,720	3,660	3,800	2,720
22	3,090	2,470	4,560	4,400	7,480	20,500	2,980	1,820	2,980	3,520	4,100	2,850
23	3,060	2,460	4,890	4,560	7,080	18,900	2,980	1,820	2,980	3,520	4,100	2,980
24	3,020	2,540	4,890	5,230	7,480	17,400	3,110	2,020	2,850	3,660	3,950	3,240
25	2,780	2,640	4,890	5,230	8,300	16,400	2,720	1,820	2,720	3,950	3,520	2,240
26	3,270	2,520	4,890	4,890	9,990	13,500	2,480	1,920	2,980	3,800	3,380	2,020
27	3,080	2,300	4,250	4,560	9,990	12,200	2,360	1,820	2,850	3,660	3,240	1,820
28	3,080	2,410	4,250	5,230	9,990	10,800	2,360	1,820	3,110	3,380	3,110	1,730
29	3,040	....	4,250	6,310	9,990	9,990	2,240	1,920	2,980	3,520	3,240	1,350
30	3,300	....	3,950	6,310	9,130	9,990	2,020	1,920	2,980	3,660	3,240	1,350
31	3,390	....	3,950	....	9,560	....	2,130	1,920	....	3,520	....	1,350

NOTE.—Daily discharge determined from a well-defined rating curve. Daily discharge Jan. 1 to Mar. 12 is record of flow at Canyon Ferry dam.

Monthly discharge of Missouri River at Toston, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	3,390	1,180	2,550	157,000	C.
February	3,940	2,300	3,070	170,000	C.
March	5,560	2,400	4,190	258,000	C.
April	6,310	3,950	4,790	285,000	B.
May	9,990	5,230	7,680	472,000	B.
June	24,900	9,130	18,800	1,120,000	B.
July	9,990	2,020	4,900	301,000	B.
August	3,520	1,820	2,460	151,000	B.
September	3,110	1,820	2,710	161,000	B.
October	3,950	2,980	3,450	212,000	B.
November	4,560	1,640	3,470	206,000	B.
December	3,240	1,350	2,700	166,000	B.
The year	24,900	1,180	5,060	3,660,000	

MISSOURI RIVER AT CASCADE, MONT.

Location.—At the highway bridge, 100 yards from the Great Northern Railway, on the east side of the town of Cascade, Mont.

Records available.—July 20, 1902, to December 31, 1911.

Drainage area.—18,300 square miles.

Gage.—Standard chain gage attached to the bridge; datum unchanged.

Channel.—Probably permanent except at extreme flood stages.

Discharge measurements.—Made from lower side of bridge.

Winter flow.—Affected by ice.

The most important tributaries between this station and the station at Toston, above, are Dearborn River, Little Prickly Pear Creek, and Prickly Pear Creek. Although irrigation is extensively practiced in the Missouri River valley, the water is taken from the tributary streams, the Missouri itself because of its high banks and great variation in flow and difficulty of diversion being little used.

Discharge measurements of Missouri River at Cascade, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 2	C. S. Heidel	Ice.	3,020	June 22	B. E. Jones	9.88	23,000
Apr. 10	J. C. Beebe	5.40	6,440	July 12	.....do	5.90	7,660
10	.....do	5.35	6,320	Aug. 16	J. C. Beebe	4.53	3,980
May 23	B. E. Jones	5.98	8,710	Sept. 23	R. Richards	4.54	3,950
24	.....do	6.48	10,100	Oct. 14	W. A. Lamb	4.80	4,420

Daily gage height, in feet, of Missouri River at Cascade, Mont., for 1911.

[W. W. Doan, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		5.5	5.7	7.1	7.0	3.8	3.95	4.45	4.9	4.6
2		5.5	5.7	7.0	7.0	3.8	3.85	4.6	4.9	4.6
3		5.6	5.7	7.3	7.0	3.95	3.8	4.6	4.8	4.5
4		5.6	5.8	8.0	7.1	4.2	3.9	4.6	4.9	4.45
5		5.5	5.4	8.4	7.1	4.2	4.15	4.6	4.8	4.45
6		5.6	5.4	8.9	7.0	4.15	4.3	4.6	4.8	4.35
7		5.7	5.1	9.3	6.8	4.2	4.1	4.8	4.8	4.35
8		5.5	5.4	9.7	6.6	4.35	4.0	4.8	4.8	4.25
9		5.5	5.8	10.0	6.3	4.25	3.75	4.8	4.8	4.35
10		5.5	6.6	10.0	6.2	4.5	3.8	4.6	5.0	4.45
11		5.4	6.7	10.1	6.0	4.5	3.85	4.8	6.8	4.45
12		5.4	6.7	10.1	5.8	4.4	3.95	4.8	7.2	4.45
13		5.3	6.1	10.3	5.6	4.4	3.8	4.8	6.2	4.6
14		5.3	6.1	10.3	5.8	4.25	4.15	4.8	5.4	5.0
15		5.3	6.2	10.4	4.8	4.6	3.9	4.8	5.7	4.7
16		5.3	6.2	10.7	4.5	4.6	3.8	4.8	5.6	4.6
17		5.0	5.6	10.9	4.35	4.25	4.3	4.9	5.8	4.6
18	5.6	5.0	4.7	10.7	4.45	4.5	4.35	4.8	6.0	4.6
19	5.5	5.3	3.4	10.6	4.4	4.6	4.5	4.9	6.2	4.7
20	5.4	5.1	3.1	10.2	4.5	4.5	4.45	4.9	6.6	4.6
21	5.4	5.3	3.05	9.9	4.35	4.4	4.45	4.8	8.2	4.3
22	5.3	5.3	4.8	10.1	4.1	4.3	4.4	4.8	6.6	4.4
23	5.4	5.3	6.0	9.7	4.0	4.05	4.4	4.9	5.7	5.0
24	5.4	5.2	6.4	9.4	3.95	3.8	4.35	4.9	5.2	5.6
25	5.3	5.5	6.2	9.2	4.05	3.8	4.35	4.9	5.3	6.2
26	5.3	5.5	6.6	8.9	4.2	3.75	4.25	4.8	5.4	6.7
27	5.3	5.6	7.0	8.3	4.3	3.9	4.15	4.8	5.2	6.3
28	5.4	5.6	7.2	7.9	4.25	4.0	4.35	4.8	5.4	6.4
29	5.4	5.6	7.1	7.5	4.2	3.95	4.4	4.8	5.2	5.0
30	5.5	5.6	7.2	7.4	3.95	3.9	4.4	4.8	4.8	6.0
31	5.5		7.1		3.95	3.9		4.9		6.4

NOTE.—Gage heights Nov. 10 to 30 and Dec. 23 to 31 distorted by ice. Low readings May 18 to 22 caused by closing of gates at Hauser Lake dam.

Daily discharge, in second-feet, of Missouri River at Cascade, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	6,760	7,400	12,400	11,600	2,260	2,580	3,760	4,650	3,850
2	....	6,760	7,400	12,000	11,600	2,260	2,360	4,150	4,650	3,850
3	....	7,080	7,400	13,100	11,600	2,580	2,260	4,150	4,380	3,590
4	....	7,080	7,730	15,800	12,000	3,140	2,470	4,150	4,650	3,460
5	....	6,760	6,450	17,300	12,000	3,140	3,020	4,150	4,380	3,460
6	....	7,080	6,450	19,200	11,600	3,020	3,380	4,150	4,380	3,220
7	....	7,400	5,560	20,800	10,900	3,140	2,910	4,380	4,380	3,220
8	....	6,760	6,450	22,300	10,100	3,500	2,690	4,380	4,380	2,980
9	....	6,760	7,730	23,500	9,040	3,260	2,160	4,380	4,380	3,220
10	....	6,760	10,500	23,500	8,690	3,890	2,260	3,850	4,350	3,460
11	....	6,450	10,900	23,900	8,000	3,890	2,360	4,380	4,320	3,460
12	....	6,450	10,900	23,900	7,340	3,630	2,580	4,380	4,290	3,460
13	....	6,150	8,740	24,700	6,700	3,630	2,260	4,380	4,260	3,850
14	....	6,150	8,740	24,700	7,340	3,260	3,020	4,380	4,230	4,930
15	....	6,150	9,080	25,100	4,380	4,150	2,470	4,380	4,200	4,110
16	....	6,150	9,080	26,400	3,590	4,150	2,260	4,380	4,170	3,850
17	....	5,270	7,080	27,200	3,220	3,260	3,380	4,650	4,140	3,850
18	7,080	5,270	4,420	26,400	3,460	3,830	3,500	4,380	4,110	3,850
19	6,760	6,150	1,510	26,000	3,340	4,150	3,890	4,650	4,090	4,110
20	6,450	5,560	1,040	24,300	3,590	3,890	3,760	4,650	4,070	3,850
21	6,450	6,150	965	23,100	3,220	3,630	3,760	4,380	4,050	3,100
22	6,150	6,150	4,700	23,900	2,630	3,380	3,630	4,380	4,030	3,340
23	6,450	6,150	8,400	22,300	2,410	2,800	3,630	4,650	4,010	3,200
24	6,450	5,850	9,780	21,100	2,300	2,260	3,500	4,650	3,990	3,100
25	6,150	6,760	9,080	20,300	2,520	2,260	3,500	4,650	3,970	3,000
26	6,150	6,760	10,500	19,100	2,860	2,160	3,260	4,380	3,950	2,900
27	6,150	7,080	12,000	16,700	3,100	2,470	3,020	4,380	3,930	2,800
28	6,450	7,080	12,800	15,200	3,260	2,690	3,500	4,380	3,910	2,700
29	6,450	7,080	12,400	13,600	3,140	2,580	3,630	4,380	3,890	2,600
30	6,760	7,080	12,800	13,200	2,580	2,470	3,630	4,380	3,870	2,500
31	6,760	....	12,400	....	2,580	2,470	....	4,650	....	2,400

NOTE.—Daily discharge determined from rating curves as follows: June 18 to July 27 and Oct. 7 to Dec. 31, fairly well defined between 2,410 and 23,500 second-feet; Mar. 18 to June 17 and July 28 to Oct. 6, fairly well defined between 3,500 and 23,500 second-feet.

Monthly discharge of Missouri River at Cascade, Mont., for 1911.

[Drainage area, 18,300 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	....	....	[a] 3,200	0.175	0.20	197,000	D.
February	....	....	[a] 3,700	.202	.21	205,000	D.
March	7,080	....	5,670	.310	.36	349,000	C.
April	7,400	5,270	6,500	.355	.40	387,000	B.
May	12,800	965	8,080	.442	.51	497,000	B.
June	27,200	12,000	20,700	1.13	1.26	1,230,000	B.
July	12,000	2,300	6,150	.336	.39	378,000	B.
August	4,150	2,160	3,140	.172	.20	193,000	B.
September	3,890	2,160	3,020	.165	.18	180,000	B.
October	4,650	3,760	4,370	.239	.28	269,000	B.
November	4,650	3,870	4,200	.230	.26	250,000	C.
December	4,930	2,400	3,400	.186	.21	209,000	C.
The year	27,200	965	6,000	.328	4.46	4,340,000	

[a] Estimated from records obtained at Canyon Ferry dam.

NOTE.—Discharge Mar. 1 to 17 estimated at 5,000 second-feet per day.

MISSOURI RIVER AT FORT BENTON, MONT.

Location.—At the public highway bridge at Fort Benton, Mont.

Records available.—July 1, 1902, to April 27, 1910, gage heights recorded by United States Weather Bureau; April 28, 1910, to December 31, 1910, United States Geological Survey records, including partial estimates of run-off for the year 1910.

Drainage area.—112,000 square miles.

Gage.—A Mott gage installed April 11, 1907, on upstream side of bridge; datum unchanged.

Channel.—Probably permanent except in flood.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Affected by ice.

Accuracy.—No estimates are made for 1911 as gage heights are in error and are not published.

Discharge measurements of Missouri River at Fort Benton, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 10	W. A. Lamb	1.95	7,240	July 9	J. C. Beebe	3.38	13,100
10	.....do	1.95	7,170	25	.....do	.93	4,130
May 31	J. C. Beebe	3.84	15,000	Aug. 30	R. Richards	.77	3,680

TRIBUTARY BASINS.

BIGHOLE RIVER BASIN.

BIGHOLE RIVER NEAR DEWEY, MONT.

Location.—In sec. 36, T. 1 N., R. 11 W., at Young's bridge, 4 miles above Dewey and 11 miles above Divide, Mont.; a few miles below the mouth of Wise River.

Records available.—September 15 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff fastened to southeast piling of bridge on downstream side.

Channel.—Rocky and clean; nonshifting.

Discharge measurements.—Made from bridge.

Winter flow.—Affected by ice.

Diversions.—Water is diverted from this stream for irrigation.

Artificial control.—A large hydroelectric power plant is in operation about 8 miles below the station.

Discharge measurements of Bighole River near Dewey, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 21	C. S. Heidel	3.96	1,060
July 8	.....do	4.94	2,040
Sept. 18	.....do	2.26	280

Daily gage height, in feet, of Bighole River near Dewey, Mont., for 1911.

[W. T. Neal, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			4.4	4.9		3.4	2.25	2.3	2.65	2.4
2			4.5	5.6		3.3	2.3	2.3	2.6	2.35
3			4.3	6.5		3.3	2.2	2.4	2.5	2.3
4			4.4	7.0		3.4	2.25	2.5	2.5	2.3
5			4.9	7.4		3.4	2.25	2.5	2.5	2.3
6			5.3	7.6		3.6	2.3	2.5	2.45	2.25
7			4.9	7.8		3.5	2.4	2.5	2.4	2.25
8			5.0	7.6	5.0	3.4	2.4	2.5	2.4	2.2
9			5.2	7.8	4.7	3.4	2.45	2.5	2.4	2.2
10			5.0	7.9	4.6	3.2	2.5	2.55	2.35	2.2
11			4.8	7.8	4.4	3.2	2.45	2.7	2.35	2.2
12	2.2		4.7	7.6	4.3	3.2	2.5	3.0	2.4	2.2
13	2.2		4.6	8.0	4.2	3.2	2.4	3.1	2.4	2.2
14	2.3		4.6		4.1	3.1	2.35	3.1	2.6	2.2
15	2.3		5.1			3.0	2.3	3.1	2.65	2.2
16	2.4		5.4		4.0	3.0	2.2	3.1	2.65	
17	2.4		5.5		4.0	2.95	2.25	3.1	2.7	
18	2.4		5.5		4.0	2.9	2.2	3.1	2.65	
19	2.45		5.3		3.9	2.85	2.2	3.1	2.7	
20	2.5		5.1		3.8	2.8	2.2	3.1	2.7	
21	2.5	4.0	4.7		3.8	2.8	2.2	3.1	2.6	
22	2.6	4.4	4.7		3.8	2.7	2.2	3.1	2.6	
23	2.7	4.4	4.7		3.7	2.6	2.2	3.0	2.6	
24	2.8	4.4	4.8		3.6	2.55	2.2	3.1	2.5	
25	2.8	4.5	4.8		3.6	2.55	2.2	3.0	2.45	
26	2.8	4.7	4.8		3.5	2.45	2.2	2.95	2.4	
27	2.8	5.0	4.7		3.5	2.45	2.2	3.0	2.4	
28	2.8	5.0	4.6		3.4	2.35	2.2	2.9	2.4	
29	2.85	5.0	4.6		3.4	2.4	2.25	2.9	2.4	
30	2.95	5.0	4.6		3.4	2.35	2.25	2.8	2.35	
31	3.2		4.6		3.4	2.25		2.65	2.3	

Daily discharge, in second-feet, of Bighole River near Dewey, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		680	1,440	1,900	4,560	755	265	280	410	315
2		700	1,530	2,740	4,190	705	280	280	390	298
3		725	1,360	4,080	3,820	705	250	315	350	280
4		750	1,440	4,950	3,460	755	265	350	350	280
5		775	1,900	5,670	3,100	755	265	350	350	280
6		800	2,330	6,[illegible]80	2,730	870	280	350	332	265
7		825	1,900	6,390	2,360	810	315	350	315	265
8		850	2,000	6,030	2,000	755	315	350	315	250
9		875	2,210	6,390	1,720	755	332	350	315	250
10		900	2,000	6,570	1,620	655	350	370	298	250
11		925	1,810	6,390	1,440	655	332	430	298	250
12	250	950	1,720	6,030	1,360	655	350	560	315	250
13	250	975	1,620	6,750	1,280	655	315	605	315	250
14	280	1,000	1,620	7,650	1,200	605	298	605	390	250
15	280	1,020	2,100	8,100	1,160	560	280	605	410	250
16	315	1,050	2,460	8,550	1,130	560	250	605	410	
17	315	1,070	2,600	10,400	1,130	538	265	605	430	
18	315	1,090	2,600	9,780	1,130	515	250	605	410	
19	332	1,100	2,330	9,160	1,060	492	250	605	430	
20	350	1,120	2,100	8,550	1,000	470	250	605	430	
21	350	1,130	1,720	8,200	1,000	470	250	605	390	
22	390	1,440	1,720	7,840	1,000	430	250	605	390	
23	430	1,440	1,720	7,480	935	390	250	560	390	
24	470	1,440	1,810	7,110	870	370	250	605	350	
25	470	1,530	1,810	6,740	870	370	250	560	332	
26	470	1,720	1,810	6,380	810	332	250	538	315	
27	470	2,000	1,720	6,010	810	332	250	560	315	
28	470	2,000	1,620	5,650	755	298	250	515	315	
29	492	2,000	1,620	5,280	755	315	265	515	315	
30	538	2,000	1,620	4,920	755	298	265	470	298	
31	655		1,620		755	265		410	280	

NOTE.—Daily discharge determined from a rating curve that is fairly well defined below 2,600 second-feet. Discharge estimated as follows: June 14, 7,650 second-feet; June 16, 8,550 second-feet; June 17, 10,400 second-feet; June 20, 8,550 second-feet. Discharge interpolated for all other days on which gage heights are missing.

Monthly discharge of Bighole River near Dewey, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 300	18,400	
February			[a] 250	13,900	
March	655		343	21,100	C.
April	2,000	680	1,160	69,000	C.
May	2,600	1,360	1,870	115,000	B.
June	10,400	1,900	6,590	392,000	C.
July	4,560	755	1,640	101,000	C.
August	870	265	551	33,900	B.
September	350	250	276	16,400	B.
October	605	280	488	30,000	B.
November	430	280	365	21,700	B.
December	315		245	15,100	C.
The year	10,400		1,170	848,000	

[a] Estimated.

NOTE.—Discharge Mar. 1 to 11 estimated at 250 second-feet per day; Dec. 16 to 31, 225 second-feet per day.

RUBY RIVER BASIN.

RUBY RIVER NEAR ALDER, MONT.

Location.—At the private bridge on Lauterbach's ranch, about 8 miles south of Alder, Mont.

Records available.—April 27, 1911, to December 31, 1911.

Drainage area.—About 540 square miles.

Gage.—Vertical staff spiked to bridge pile 4 feet from right bank.

Channel.—Probably permanent, or only slightly shifting. Bed of stream below the gage composed of gravel and pebbles. At the gage the water is deeper and the material of the bed is finer.

Discharge measurements.—At low and ordinary stages made by wading on riffle at control 200 feet below gage; high-stage measurements made from downstream side of bridge.

Winter flow.—Affected by ice.

Discharge measurements of Ruby River near Alder, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 28	C. S. Heidel	4.18	189
June 12	do	5.75	711
July 14	do	4.08	158
Sept. 15	do	3.89	116

Daily gage height, in feet, of Ruby River near Alder, Mont., for 1911.

[Leo Hadel, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	4.0	5.4	4.7	4.0	3.8	4.0	4.0
2	....	4.1	5.5	4.7	4.1	3.7	4.0	4.0
3	....	4.1	5.6	4.6	4.0	3.7	4.1	4.0
4	....	4.3	6.3	4.6	4.0	3.7	4.0	4.0
5	....	4.5	6.3	4.5	4.1	3.8	4.0	4.0
6	....	5.1	6.2	4.4	4.3	3.8	4.0	4.0
7	....	4.6	....	4.4	4.3	3.8	4.0	4.0
8	....	4.7	....	4.4	4.2	3.8	4.0	4.0
9	....	4.5	6.3	4.3	4.2	3.8	4.0	4.0
10	....	4.6	5.8	4.2	4.2	3.8	4.0	4.0
11	....	4.5	6.0	4.2	4.1	3.8	4.0	4.0
12	....	4.6	5.8	4.1	4.1	3.8	4.0	4.0
13	....	4.5	6.1	4.1	4.1	4.0	4.1	4.0
14	....	4.9	6.1	4.1	4.1	4.0	4.0	4.0
15	....	5.2	5.9	4.1	4.1	3.9	4.0	4.0
16	....	5.0	5.7	4.0	4.1	3.9	4.0	4.0
17	....	4.8	5.5	4.0	4.1	3.9	4.0	4.0
18	....	4.6	5.4	4.0	4.0	3.9	4.0	4.0
19	....	4.7	5.3	4.0	4.0	3.9	3.9	4.0
20	....	4.5	5.3	4.0	4.0	3.9	3.9	4.0
21	....	4.5	5.4	4.0	4.0	4.0	4.0	4.0
22	....	4.5	5.1	4.0	3.9	3.9	4.0	3.9
23	....	5.3	4.9	4.0	3.9	3.9	4.0	3.9
24	....	5.6	4.8	4.0	3.9	4.0	4.0	3.9
25	....	5.2	4.7	4.0	3.9	4.0	4.0	3.9
26	....	5.2	4.7	4.0	3.9	4.0	4.0	3.9
27	....	5.4	4.7	4.1	3.8	4.0	4.0	3.9
28	4.2	5.4	4.7	4.0	3.8	4.0	4.0	3.9
29	4.1	5.3	4.8	4.0	3.8	4.0	3.9	3.9
30	4.0	5.0	4.8	4.0	3.8	4.0	3.9	3.9
31	....	5.1	....	4.0	3.8	....	3.9	....

Daily discharge, in second-feet, of Ruby River near Alder, Mont., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	141	579	340	141	95	141	141
2	....	166	615	340	166	76	141	141
3	....	166	652	308	141	76	166	141
4	....	219	920	308	141	76	141	141
5	....	277	920	277	166	95	141	141
6	....	472	880	247	219	95	141	141
7	....	308	895	247	219	95	141	141
8	....	340	910	247	192	95	141	141
9	....	277	920	219	192	95	141	141
10	....	308	726	192	192	95	141	141
11	....	277	802	192	166	95	141	141
12	....	308	726	166	166	95	141	141
13	....	277	840	166	166	141	166	141
14	....	405	840	166	166	141	141	141
15	....	507	764	166	166	117	141	141
16	....	438	689	141	166	117	141	141
17	....	372	615	141	166	117	141	141
18	....	308	579	141	141	117	141	141
19	....	340	543	141	141	117	117	141
20	....	277	543	141	141	117	117	141
21	....	277	579	141	141	141	141	141
22	....	277	472	141	117	117	141	117
23	....	543	405	141	117	117	141	117
24	....	652	372	141	117	141	141	117
25	....	507	340	141	117	141	141	117
26	....	507	340	141	117	141	141	117
27	....	579	340	166	95	141	141	117
28	192	579	340	141	95	141	141	117
29	166	543	372	141	95	141	117	117
30	141	438	372	141	95	141	117	117
31	....	472	....	141	95	....	117	....

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of Ruby River near Alder, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	652	141	373	22,900	B.
June	920	340	630	37,500	B.
July	340	141	189	11,600	B.
August	219	95	147	9,040	B.
September	141	76	114	6,780	B.
October	166	117	139	8,550	B.
November	141	117	134	7,970	B.
December			[a] 100	6,150	D.
The period				110,000	

[a] Estimated.

PIPESTONE CREEK BASIN.

PIPESTONE CREEK NEAR WHITEHALL, MONT.

Location.—Six miles west of Whitehall, Mont., at Peyton Allred's ranch, a short distance above junction of Pipestone and Little Pipestone creeks.

Records available.—October 13, 1910, to September 30, 1911.

Gage.—Staff fastened securely to a large post on the left bank of the stream directly north of the observer's house.

Channel.—Sandy and shifting.

Cooperation.—Gage heights and discharge measurements supplied by G. E. Baker.

Discharge measurements of Pipestone Creek near Whitehall, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 9	Baker and Bell	0.68	12.9	Apr. 20	Baker and Bell	1.00	24.3
Mar. 9	do	.66	12.2	July 16	C. S. Heidel	1.00	2.47
Apr. 19	do	1.03	26.4	16	G. E. Baker	1.01	2.27

Daily gage height, in feet, and discharge, in second-feet, of Pipestone Creek near Whitehall, Mont., for 1910.

[Mrs. Payton Allred, observer.]

Day.	October.		November.		December.		Day.	October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			0.6	5	0.85	15	16	0.5	2.5	0.5	3.5	0.7	10
2			.6	5	.8	13	17	.5	2.5	.7	10	.75	13
3			.6	5	.8	13	18	.55	3.5	.8	13	.75	13
4			.55	3.5	.85	15	19	.55	3.5	.8	13	.75	13
5			.5	2.5	.85	15	20	.55	3.5	.8	13	.7	11
6			.55	3.5	.9	16	21	.5	2.5	.8	13	.7	11
7			.55	3.5	.9	16	22	.5	2.5	.8	13	.7	11
8			.6	5	.85	15	23	.5	2.5	.8	13	.7	11
9			.6	5	.85	15	24	.5	2.5	.75	12	.7	11
10			.6	5	.8	13	25	.55	3.5	.75	12	.7	11
11			.6	5	.8	13	26	.55	3.5	.75	12	.7	11
12			.6	6.5	.8	13	27	.55	3.5	.75	12	.7	11
13	0.5	2.5	.6	6.5	.75	12	28	.55	3.5	.8	13	.7	11
14	.5	2.5	.5	3.5	.75	12	29	.55	3.5	.8	13	.7	11
15	.5	2.5	.5	3.5	.7	10	30	.55	3.5	.85	15	.7	11
							31	.55	3.5			.7	11

Daily gage height, in feet, of Pipestone Creek near Whitehall, Mont., for 1911.

[Mrs. Payton Allred, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1....	0.6	0.85	1.2	1.8	1.7	1.0	0.9	16....	0.7	0.8	1.5	1.8	1.0	0.95	0.95
2....	.6	.9	1.2	2.1	1.3	1.1	.9	17....	.7	.85	1.4	1.9	1.0	.95	......
3....	.6	.9	1.1	1.7	1.6	1.1	.9	18....	.7	.85	1.3	1.8	1.0	.95	......
4....	.6	.85	1.1	1.8	1.3	1.15	.9	19....	.75	.85	1.3	1.8	.95	.95	......
5....	.6	.8	1.15	2.0	1.3	1.2	.95	20....	.75	.9	1.25	2.2	.95	.9	......
6....	.7	.75	1.5	1.8	1.2	1.2	.95	21....	.8	.9	1.25	2.0	1.0	.9	......
7....	.7	.75	1.2	1.9	1.2	1.0	1.0	22....	.85	1.0	1.2	1.8	1.0	.9	......
8....	.7	.75	1.25	1.9	1.1	1.0	.95	23....	.95	1.0	1.35	1.65	1.0	.9	......
9....	.65	.75	1.4	2.2	1.0	1.0	.95	24....	.95	1.0	1.4	1.55	1.0	.9	......
10....	.65	.75	1.2	1.8	1.0	1.0	.95	25....	.85	1.0	1.5	1.5	.95	.95	......
11....	.65	.75	1.2	1.8	1.0	1.0	.95	26....	.75	1.0	1.5	1.5	.95	.95	......
12....	.7	.75	1.2	1.8	1.0	.95	.95	27....	.75	1.5	1.5	1.5	.95	.95	......
13....	.7	.8	1.2	1.8	1.0	.95	.95	28....	.75	1.45	1.5	1.5	.95	.95	......
14....	.7	.8	1.2	1.8	1.0	.95	.95	29....	.75	1.2	1.5	1.5	1.0	.9	......
15....	.7	.8	1.4	1.8	1.0	.95	.95	30....	.8	1.0	1.5	1.6	1.0	.9	......
								31....	.8	......	1.5	......	1.0	.9	......

Daily discharge, in second-feet, of Pipestone Creek near Whitehall, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1....	10	19	33	67	33	2.5	0.5	16....	13	17	49	53	2.5	1.5	1.5
2....	10	21	33	87	17	5.0	.5	17....	13	19	43	58	2.5	1.5	......
3....	10	21	29	61	28	5.0	.5	18....	13	19	38	49	2.5	1.5	......
4....	10	19	29	67	15	6.5	.5	19....	15	19	38	49	1.5	1.5	......
5....	10	17	31	80	15	8.0	1.5	20....	15	21	36	73	1.5	.5	......
6....	13	15	49	63	11	8.0	1.5	21....	17	21	36	61	2.5	.5	......
7....	13	15	33	71	11	2.5	2.5	22....	19	25	33	45	2.5	.5	......
8....	13	15	36	71	7	2.5	1.5	23....	23	25	40	37	2.5	.5	......
9....	12	15	43	87	4	2.5	1.5	24....	23	25	43	33	2.5	.5	......
10....	12	15	33	57	4	2.5	1.5	25....	19	25	49	30	1.5	1.5	......
11....	12	15	33	57	4	2.5	1.5	26....	15	25	49	27	1.5	1.5	......
12....	13	15	33	57	2.5	1.5	1.5	27....	15	49	49	27	1.5	1.5	......
13....	13	17	33	57	2.5	1.5	1.5	28....	15	46	49	27	1.5	1.5	......
14....	13	17	33	53	2.5	1.5	1.5	29....	15	33	49	27	2.5	.5	......
15....	13	17	43	53	2.5	1.5	1.5	30....	17	25	49	29	2.5	.5	......
								31....	17	......	49	......	2.5	.5	......

NOTE.—Daily discharge determined as follows: Oct. 13,1910, to June 5, 1911, from curve fairly well defined below 35 second-feet; June 6 to July 15, by indirect method for shifting channels; July 16 to Sept. 16, from curve drawn parallel to other curve but poorly defined.

Monthly discharge of Pipestone Creek near Whitehall, Mont., for 1910–11.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1910.					
October 13–31	3.5	2.5	3.03	114	B.
November	15	2.5	8.28	493	B.
December	16	10	12.5	769	B.
1911.					
January	....	....	[a] 10	615	D.
February	....	....	[a] 12	666	D.
March	23	10	14.2	873	B.
April	49	15	21.6	1,290	B.
May	49	29	39.5	2,430	C.
June	87	27	53.8	3,200	C.
July	33	1.5	6.23	383	C.
August	8	.5	2.24	138	C.
September	1.5	.5	1.40	83.3	C.
The period	....	....	....	9,680	

[a] Estimated.

NOTE.—Discharge Sept. 17 to 30 estimated at 1.5 second-feet per day.

WHITETAIL CREEK BASIN.

WHITETAIL CREEK AT WHITEHALL, MONT.

Location.—At highway bridge in the northeast part of the town.

Records available.—March 19 to June 30, 1911.

Drainage area.—Not measured.

Gage.—Staff gage nailed to pile on upstream side of bridge.

Channel.—Sandy; liable to shift.

Discharge measurements.—Made by wading at ordinary stages.

Winter flow.—Affected by ice.

Artificial control.—Water is diverted above the station for irrigation.

Cooperation.—Gage heights and discharge measurements supplied by G. E. Baker.

Discharge measurements of Whitetail Creek at Whitehall, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 28	Geo. E. Baker	2.35	14.9	Apr. 22	Geo. E. Baker	4.42	66.3
Apr. 8	.....do	2.80	24.8	26	.....do	5.11	96.9
19	.....do	4.59	75.5	27	.....do	5.66	123.4
20	.....do	3.88	50.9	July 16[b]	Baker and Heidel	1.57	0.6

[b] Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Whitetail Creek at Whitehall, Mont., for 1911.

[G. E. Baker, observer.]

Day.	March.		April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	....	....	2.44	17	3.80	48	2.80	24
2	....	....	2.50	18	3.50	39	3.70	45
3	....	....	2.50	18	3.55	40	4.70	80
4	....	....	2.75	23	3.50	39	4.80	84
5	....	....	2.45	17	3.90	51	5.10	96
6	....	....	3.00	28	4.50	72	5.10	96
7	....	....	2.90	26	3.50	39	4.05	56
8	....	....	2.80	24	3.75	46	3.75	46
9	....	....	2.90	26	3.30	34	4.00	54
10	....	....	2.95	27	3.20	32	3.80	48
11	....	....	2.80	24	2.85	25	3.40	36
12	....	....	2.65	21	2.45	17	2.90	26
13	....	....	2.85	25	2.45	17	2.80	24
14	....	....	2.60	20	2.40	16	2.70	22
15	....	....	2.45	17	2.30	14	2.50	18
16	....	....	2.40	16	4.00	54	2.40	16
17	....	....	3.00	28	3.95	52	2.30	14
18	....	....	2.67	21	3.40	36	2.20	12
19	2.50	18	4.61	76	3.00	28	2.10	10
20	2.55	19	3.88	50	2.80	24	2.20	12
21	2.60	20	4.70	80	2.70	22	2.30	14
22	2.50	18	4.42	69	2.50	18	2.40	16
23	2.60	20	3.70	45	2.40	16	2.50	18
24	2.60	20	3.65	44	2.50	18	2.30	14
25	2.50	18	3.85	50	3.40	36	2.30	14
26	2.30	14	5.11	96	3.75	46	2.20	12
27	2.40	16	5.67	124	3.50	39	2.50	18
28	2.35	15	5.10	96	3.60	42	2.30	14
29	2.35	15	4.50	72	3.70	45	2.20	12
30	2.40	16	3.90	51	3.45	38	2.30	14
31	2.30	14	....	....	3.00	28	....	....

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Whitetail Creek at Whitehall, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 19-31	20	14	17.1	440	A.
April	124	16	41.6	2,480	A.
May	72	14	34.6	2,130	A.
June	96	10	32.2	1,920	A.

LITTLE WHITETAIL CREEK NEAR WHITEHALL, MONT.

Location.—At Collins's ranch, about 7 miles above Whitehall.

Records available.—March 17 to September 22, 1911.

Drainage area.—Not measured.

Gage.—Staff gage on right bank just above ford near the stables.

Channel.—Sandy and shifting.

Discharge measurements.—Made by wading at different sections.

Winter flow.—Is affected by ice.

Artificial control.—Water is diverted for irrigating.

Accuracy.—Fair. The shifting affects the results to some extent.

Cooperation.—Gage heights and discharge measurements supplied by G. E. Baker.

Discharge measurements of Little Whitetail Creek near Whitehall, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 7	Geo. E. Baker	1.06	4.7
Apr. 19	do	1.10	4.7
July 16	do	.92	1.8
16	C. S. Heidel	.94	2.0

Daily gage height, in feet, of Little Whitetail Creek near Whitehall, Mont., for 1911.

[Ella Collins, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		1.20	1.20	1.20	0.80	0.90	1.00	16	1.10	1.20	1.20	1.10		1.00	0.90
2		1.20	1.20	1.30	.80	.90	1.00	17	1.00	1.20	1.10	1.00		1.00	.90
3		1.20	1.20	1.40	.80	.90	1.00	18	1.00	1.20	1.00	1.00		1.00	.90
4		1.20	1.10	1.30	.80	.90	1.00	19	1.00	1.10	1.00	1.00		1.00	.90
5		1.20	1.10	1.30	.80	.90	1.00	20	1.10	1.10	.90	1.00		1.00	.90
6		1.20	1.00	1.30	.80	.90	1.00	21	1.20	1.10	.90	1.00		1.00	.90
7	1.10	1.20	1.00	1.20	.90	.90	1.00	22	1.30	1.10	.90	.90		1.00	.90
8	1.10	1.20	1.10	1.30	.90	.90	1.00	23	1.20	1.10	.90	.90	0.90	1.00	
9	1.10	1.20	1.10	1.40	.80	.90	1.00	24	1.20	1.10	.90	.90	.90	1.10	
10	1.00	1.20	1.10	1.30	.80	1.00	.80	25	1.20	1.10	.90	.90	.90	1.10	
11	1.10	1.20	1.10	1.20	.80	1.00	.80	26	1.20	1.20	.90	.90	.90	1.10	
12	1.10	1.20	1.00	1.10	.90	1.00	.90	27	1.20	1.30	.90	.90	.90	1.00	
13	1.10	1.10	1.00	1.10		1.00	.90	28	1.10	1.40	.90	.90	.90	1.00	
14	1.10	1.20	.80	1.10		1.00	.90	29	1.10	1.30	.90	.80	.90	1.00	
15	1.10	1.10	.90	1.10		1.00	1.00	30	1.10	1.20	.90	.80	.90	1.00	
								31	1.10		.90		.90	1.00	

Daily discharge, in second-feet, of Little Whitetail Creek near Whitehall, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.0	7.2	6.8	6.8	.6	1.5	2.9	16	5.4	7.0	6.8	4.7	1.5	2.9	1.5
2	5.0	7.2	6.8	9.1	.6	1.5	2.9	17	3.3	7.0	4.7	2.9	1.5	2.9	1.5
3	5.1	7.2	6.8	12.0	.6	1.5	2.9	18	3.3	7.0	2.9	2.9	1.5	2.9	1.5
4	5.2	7.2	4.7	9.1	.6	1.5	2.9	19	3.3	4.8	2.9	2.9	1.5	2.9	1.5
5	5.3	7.2	4.7	9.1	.6	1.5	2.9	20	5.2	4.7	1.5	2.9	1.5	2.9	1.5
6	5.4	7.2	2.9	9.1	.6	1.5	2.9	21	7.3	4.7	1.5	2.9	1.5	2.9	1.5
7	5.4	7.0	2.9	6.8	1.5	1.5	2.9	22	9.7	4.7	1.5	1.5	1.5	2.9	1.5
8	5.4	7.0	4.7	9.1	1.5	1.5	2.9	23	7.3	4.7	1.5	1.5	1.5	2.9	1.5
9	5.4	7.0	4.7	12.0	.6	1.5	2.9	24	7.3	4.7	1.5	1.5	1.5	4.7	1.5
10	3.5	7.0	4.7	9.1	.6	2.9	.6	25	7.3	4.7	1.5	1.5	1.5	4.7	1.5
11	5.4	7.0	4.7	6.8	.6	2.9	.6	26	7.3	6.8	1.5	1.5	1.5	4.7	1.5
12	5.4	7.0	2.9	4.7	1.5	2.9	1.5	27	7.3	9.1	1.5	1.5	1.5	2.9	1.5
13	5.4	4.8	2.9	4.7	1.5	2.9	1.5	28	5.0	12.0	1.5	1.5	1.5	2.9	1.5
14	5.4	7.0	.6	4.7	1.5	2.9	1.5	29	5.0	9.1	1.5	.6	1.5	2.9	1.5
15	5.4	4.8	1.5	4.7	1.5	2.9	2.9	30	5.0	6.8	1.5	.6	1.5	2.9	1.5
								31	5.0	......	1.5	......	1.5	2.9	......

NOTE.—Daily discharge determined from a fairly well-defined rating curve Apr. 19 to end of season. Indirect method used Mar. 7 to Apr. 18. Discharge estimated Mar. 1 to 6, July 13 to 22, and Sept. 23 to 30.

Monthly discharge of Little Whitetail Creek near Whitehall, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March	9.7	3.3	5.54	341	C.
April	12	4.7	6.65	396	C.
May	6.8	.6	3.15	194	B.
June	12	.6	4.96	295	B.
July	1.5	.6	1.24	76.2	B.
August	4.7	1.5	2.67	164	B.
September	2.9	.6	1.89	112	B.
The period	....	....	....	1,580	

GALLATIN RIVER BASIN.

WEST GALLATIN RIVER NEAR SALESVILLE, MONT.

Location.—On highway bridge 4 miles above Salesville, Mont., just below mouth of canyon. Above the station Spanish Creek is the most important tributary.

Records available.—July 18, 1895, to December 31, 1905; August 9 to December 31, 1910; and July to December, 1911.

Drainage area.—860 square miles.

Gage.—Standard chain, boxed and fastened near middle of bridge on upstream side; datum unchanged.

Channel.—Bed of stream is of gravel and small bowlders, and will not shift.

Discharge measurements.—Made from the lower side of the highway bridge.

Diversions.—Irrigation is practiced extensively on this stream, and practically the entire low-water flow of the river is appropriated.

Discharge measurements of West Gallatin River near Salesville, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 19	R. Richards	4.27	1,220
Aug. 22	C. S. Heidel	3.37	564
Nov. 8	B. E. Jones	3.17	425

Daily gage height, in feet, and discharge, in second-feet, of West Gallatin River near Salesville, Mont., for 1910.

[Mrs. James Gant, observer.]

Day.	Aug.		Sept.		Oct.		Nov.		Dec.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	....	475	3.1	390	3.1	390	3.25	452	3.2	430
2	....	475	3.1	390	3.2	430	3.35	502	3.05	372
3	....	475	3.1	390	3.2	430	3.25	452	3.05	372
4	....	475	3.2	430	3.2	430	3.25	452	3.15	410
5	....	475	3.2	430	3.3	475	3.2	430	3.0	355
6	....	475	3.2	430	3.3	475	3.2	430	3.0	355
7	....	475	3.2	430	3.3	475	3.2	430	3.05	372
8	....	475	3.2	430	3.3	475	3.2	430	3.1	390
9	3.3	475	3.2	430	3.2	430	3.2	430	3.0	355
10	3.2	430	3.2	430	3.3	475	3.1	390	2.9	330
11	3.2	430	3.2	430	3.2	430	3.1	390	3.0	355
12	3.2	430	3.2	430	3.2	430	3.2	430	3.0	355
13	3.4	530	3.2	430	3.3	475	3.05	372	2.95	342
14	3.2	430	3.2	430	3.2	430	3.05	372	2.95	342
15	3.2	430	3.2	430	3.2	430	3.15	410	3.0	355
16	3.2	430	3.2	430	3.2	430	3.0	355	3.0	355
17	3.1	390	3.2	430	3.3	475	3.0	355	2.95	342
18	3.1	390	3.2	430	3.3	475	3.1	390	3.0	355
19	3.1	390	3.2	430	3.3	475	3.2	430	3.05	372
20	3.1	390	3.2	430	3.4	530	3.1	390	3.05	372
21	3.0	355	3.2	430	3.2	430	3.1	390	2.95	342
22	3.0	355	3.2	430	3.2	430	3.25	452	3.0	355
23	3.0	355	3.2	430	3.3	475	3.15	410	3.05	372
24	3.1	390	3.2	430	3.2	430	3.15	410	3.0	355
25	3.1	390	3.1	390	3.2	430	3.25	452	2.95	342
26	3.1	390	3.2	430	3.3	475	3.15	410	3.0	355
27	3.1	390	3.2	430	3.3	475	3.1	390	3.05	372
28	3.0	355	3.2	430	3.2	430	3.2	430	3.05	372
29	3.0	355	3.1	390	3.2	430	3.1	390	2.95	342
30	3.1	390	3.0	355	3.3	475	3.1	390	3.0	355
31	3.1	390	....	....	3.2	430	....	....	3.05	372

Daily gage height, in feet, and discharge, in second-feet, of West Gallatin River near Salesville, Mont., for 1911.

[C. L. Crew, observer.]

Day.	July.		Aug.		Sept.		Oct.		Nov.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	....	....	3.75	762	3.25	452	3.25	452	3.05	372
2	....	....	3.90	880	3.30	475	3.30	475	3.10	390
3	....	....	3.75	762	3.25	452	3.25	452	3.05	372
4	....	....	3.80	800	3.30	475	3.30	475	3.20	430
5	....	....	3.75	762	3.35	502	3.25	452	3.15	410
6	....	....	3.80	800	3.35	502	3.25	452	3.15	410
7	....	....	3.75	762	3.40	530	3.30	475	3.20	430
8	....	....	3.80	800	3.35	502	3.25	452	3.05	372
9	....	....	3.70	725	3.40	530	3.30	475	3.10	390
10	....	....	3.65	690	3.25	452	3.25	452	3.05	372
11	....	....	3.70	725	3.25	452	3.25	452	....	....
12	....	....	3.60	655	3.30	475	3.30	475	....	....
13	....	....	3.60	655	3.35	502	3.25	452	....	....
14	....	....	3.55	622	3.40	530	3.30	475	....	....
15	....	....	3.55	622	3.35	502	3.25	452	....	....
16	....	....	3.50	590	3.35	502	3.25	452	....	....
17	....	....	3.45	560	3.30	475	3.30	475	....	....
18	....	....	3.45	560	3.25	452	3.25	452	....	....
19	4.30	1,240	3.35	502	3.30	475	3.30	475	....	....
20	4.25	1,190	3.35	502	3.25	452	3.25	452	....	....

Daily gage height, in feet, and discharge, in second-feet, of West Gallatin River near Salesville, Mont., for 1911—Continued.

Day.	July.		Aug.		Sept.		Oct.		Nov.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
21	4.30	1,240	3.40	530	3.25	452	3.15	410		
22	4.20	1,140	3.35	502	3.30	475	3.20	430		
23	4.10	1,060	3.40	530	3.25	452	3.25	452		
24	4.05	1,010	3.35	502	3.30	475	3.30	475		
25	3.95	922	3.25	452	3.25	452	3.25	452		
26	4.00	965	3.30	475	3.25	452	3.15	410		
27	3.85	840	3.25	452	3.30	475	3.20	430		
28	3.90	880	3.30	475	3.25	452	3.15	410		
29	3.85	840	3.25	452	3.30	475	3.20	430		
30	3.85	840	3.30	475	3.25	452	3.05	372		
31	3.80	800	3.25	452			3.05	372		

NOTE.—Daily discharge determined from a rating curve that is fairly well defined for all gage heights.

Monthly discharge of West Gallatin River near Salesville, Mont., for 1910–11.

[Drainage area, 860 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1910.							
August	530	355	421	0.490	0.56	25,900	B.
September	430	355	421	.490	.55	25,100	B.
October	530	390	451	.524	.60	27,700	B.
November	502	355	414	.481	.54	24,600	B.
December	430	330	362	.421	.49	22,300	B.
1911.							
July 19–31	1,240	800	997	1.16	.56	25,700	B.
August	880	452	614	.714	.82	37,800	B.
September	530	452	477	.555	.62	28,400	B.
October	475	372	447	.520	.60	27,500	B.
November			382	.444	.50	22,700	C.
December			325	.378	.44	20,000	D.

NOTE.—Discharge Aug. 1 to 8, 1910, estimated at 475 second-feet.
NOTE.—Mean for December estimated; mean for period Nov. 11 to 30 estimated at 375 second-feet.

DEEP CREEK BASIN.

DEEP CREEK NEAR TOWNSEND, MONT.

Location.—In sec. 29, T. 7 N., R. 4 E., Montana principal meridian, unsurveyed, 12 miles from Townsend, directly back of the ranger station in the canyon of Deep Creek, approximately 10 miles above the confluence with the Missouri River.

Records available.—October 9, 1910, to June 30, 1911.

Drainage area.—89 square miles.

Gage.—Vertical staff.

Channel.—Small rock; probably permanent.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversion.—Small quantities of water are diverted for irrigation on small flats above the gage. Below the gage, nearly the entire flow is diverted, or will eventually be diverted, for irrigation on the land adjoining this creek and Missouri River.

Discharge measurements of Deep Creek near Townsend, Mont., in 1910–11.

Date.	Hydrographer.	Gage height.	Discharge.
1910.		*Feet.*	*Sec.-ft.*
Oct. 30	John C. Beebe	0.78	17.4
1911.			
May 12	F. E. Bonner	1.29	45

Daily gage height, in feet, of Deep Creek near Townsend, Mont., for 1910.

[D. N. Maryott, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	......	0.76	......	0.71	16	......	0.75	0.71	0.69
2	......	......	0.71	.71	17	......	.74	.71	.69
3	......	......	.71	.71	18	......	.73	.71	.68
4	......	......	.71	.70	19	......	.73	.71	.68
5	......	......	.72	.70	20	......	.72	.71	.66
6	......	......	.72	.70	21	......	.72	.71	.66
7	......	......	.71	.70	22	......	.72	.71	.65
8	......	......	.71	.70	23	......	.72	.71	.65
9	......	.75	.71	.70	24	......	.71	.71	.65
10	......	.75	.71	.70	25	......	.72	.71	......
11	......	.76	.71	.70	26	......	.73	.72	......
12	......	.76	.71	.70	27	......	.73	.72	......
13	......	.76	.71	.70	28	......	.72	.71	......
14	......	.76	.71	.69	29	......	.71	.71	......
15	......	.76	.71	.69	30	0.78	.71	.71	......
					31	......	.74	......	......

Daily gage height, in feet, of Deep Creek near Townsend, Mont., for 1911.

[D. N. Maryott, observer.]

Day.	Mar.	Apr.	May.	June.	Day.	Mar.	Apr.	May.	June.
1	0.63	0.98	1.42	1.10	16	0.67	0.89	1.28	1.02
2	.63	1.04	1.46	1.10	17	.67	.96	1.30	1.02
3	.64	1.04	1.47	1.08	18	.69	1.04	1.30	1.00
4	.64	1.01	1.50	1.06	19	.70	1.08	1.27	1.00
5	.63	1.01	1.55	1.06	20	.70	1.09	1.24	.98
6	.63	.96	1.55	1.08	21	.70	1.13	1.26	.96
7	.63	.90	1.50	1.08	22	.72	1.13	1.26	.96
8	.64	.88	1.50	1.06	23	.75	1.20	1.24	.94
9	.64	.88	1.46	1.04	24	.79	1.22	1.20	.96
10	.65	.86	1.38	1.04	25	.76	1.30	1.18	.96
11	.65	.85	1.28	1.04	26	.70	1.36	1.18	.94
12	.65	.85	1.28	1.02	27	.70	1.38	1.16	.94
13	.66	.84	1.28	.98	28	.74	1.36	1.14	.92
14	.66	.85	1.30	.98	29	.80	1.36	1.14	.92
15	.67	.86	1.28	.98	30	.86	1.39	1.11	.92
					31	.90	......	1.11	......

PRICKLY PEAR CREEK BASIN.

PRICKLY PEAR CREEK NEAR CLANCY, MONT.

Location.—On the private wagon bridge back of the ranch buildings on the Stafford ranch and just to the right of the Great Northern Railway, about 1 mile below Clancy and just below the mouth of Lump Gulch Creek. This station was established to take the place of the one previously maintained about a mile below. The same amount of water passes both stations.

Records available.—July 15, 1908, to June 30, 1909 (old site); July 12, 1910, to December 31, 1911 (present site).

Drainage area.—Not measured.

Gage.—Staff, nailed to bridge abutment, right bank, on downstream side.

Discharge measurements.—Made from the wagon bridge or by wading.

Winter flow.—Ice is common in extreme cold weather.

Diversions.—Irrigation is carried on to some extent along this stream, the greater number of diversions being made below the station.

Discharge measurements of Prickly Pear Creek near Clancy, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 1	B. E. Jones	2.56	162
July 20	do	1.58	34

Daily gage height, in feet, of Prickly Pear Creek near Clancy, Mont., for 1911.

[H. Y. Barrows, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		1.79	1.90	2.60	2.38	1.43	1.38	1.59	1.53
2		1.80	1.95	3.00	2.10	1.42	1.39	1.60	1.52
3		1.62	1.96	2.98	2.08	1.44	1.48	1.58	1.52
4		1.64	2.00	3.18	2.16	1.52	1.50	1.56	1.50
5		1.55	2.15	3.13	2.00	1.61	1.60	1.54	1.50
6		1.50	2.35	2.93	1.96	1.70	1.68	1.54	1.50
7		1.54	2.10	2.88	1.89	1.78	1.66	1.53	1.50
8		1.62	2.10	3.18	1.85	1.75	1.64	1.52	1.50
9		1.70	2.12	3.10	1.84	1.72	1.63	1.54	1.62
10		1.74	2.10	3.00	1.83	1.68	1.61	1.82	
11		1.71	2.03	2.86	1.81	1.71	1.63	1.79	
12		1.60	2.01	2.83	1.80	1.69	1.58	1.64	
13		1.56	1.99	2.80	1.76	1.62	1.59	1.62	
14		1.54	2.02	2.76	1.68	1.60	1.55	1.69	
15		1.50	2.12	2.68	1.70	1.54	1.54	1.67	
16		1.63	2.32	2.60	1.78	1.52	1.51	1.61	
17		1.70	2.25	2.48	1.61	1.51	1.50	1.60	
18	1.60	1.70	2.18	2.36	1.58	1.48	1.50	1.60	
19	1.70	1.72	2.10	2.40	1.45	1.42	1.50	1.60	
20	1.81	1.70	2.08	2.48	1.48	1.41	1.48	1.58	
21	1.83	1.80	2.05	2.41	1.70	1.39	1.48	1.55	
22	1.72	1.91	2.08	2.33	1.63	1.40	1.48	1.54	
23	1.82	1.92	2.14	2.19	1.61	1.41	1.49	1.54	
24	1.80	1.85	2.16	2.23	1.58	1.39	1.50	1.53	
25	1.81	1.90	2.15	2.20	1.50	1.40	1.51	1.52	
26	1.82	2.00	2.18	2.18	1.52	1.40	1.54	1.52	
27	1.52	2.88	2.12	2.08	1.54	1.40	1.51	1.54	
28	1.69	2.40	2.16	2.18	1.48	1.39	1.47	1.53	
29	1.73	1.94	2.25	2.16	1.41	1.40	1.53	1.53	
30	1.72	1.91	2.30	2.18	1.42	1.40	1.55	1.54	
31	1.72		2.54		1.45	1.40		1.54	

Daily discharge, in second-feet, of Prickly Pear Creek near Clancy, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		40	52	170	151	23	20	34	29
2		41	58	259	91	22	20	35	29
3		25	59	231	88	23	26	33	29
4		26	64	300	102	29	27	32	27
5		20	86	289	84	36	35	30	27
6		17	120	256	77	45	43	30	27
7		19	78	242	72	55	41	29	27
8		25	78	310	62	52	39	29	27
9		31	81	292	61	48	38	30	37
10		35	78	272	60	43	36	61	
11		32	68	260	57	46	38	57	
12		23	65	231	56	44	33	39	
13		21	63	224	51	37	34	37	
14		19	67	213	42	35	31	44	
15		17	81	196	44	30	30	42	
16		25	115	188	55	29	28	36	
17		31	102	162	36	28	27	35	
18	23	31	91	139	33	26	27	35	
19	31	33	78	147	24	22	27	35	
20	42	31	75	162	26	22	26	33	
21	44	41	71	149	45	20	26	31	
22	33	53	75	132	38	21	26	30	
23	43	54	84	107	36	22	26	30	
24	41	46	88	114	33	20	27	29	
25	42	52	86	110	27	21	28	29	
26	43	64	91	105	29	21	30	29	
27	18	232	81	88	30	21	28	30	
28	30	130	88	105	26	20	25	29	
29	34	57	102	101	22	21	29	29	
30	33	53	111	105	22	21	31	30	
31	33		158		24	21		30	

NOTE.—Daily discharge determined from rating curves as follows: Mar. 18 to May 31, well defined; indirect method for shifting channels used June 1 to July 20; July 21 to Nov. 8, curve poorly defined.

Monthly discharge of Prickly Pear Creek near Clancy, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 30	1,840	D.
February			[a] 25	1,390	D.
March			29.5	1,810	C.
April	232	17	43.9	2,610	B.
May	158	52	83.7	5,150	B.
June	310	88	189	11,200	C.
July	151	22	51.7	3,180	C.
August	55	20	29.8	1,830	C.
September	43	20	30.1	1,790	C.
October	61	29	34.3	2,110	C.
November			22.6	1,340	C.
December			[a] 20	1,230	D.
The year			49.7	35,500	

[a] Estimated.

NOTE.—Discharge Mar. 1 to 17 estimated at 25 second-feet and Nov. 10 to 30 estimated at 20 second-feet.

PRICKLY PEAR CREEK AT EAST HELENA, MONT.

Location.—In NE. ¼ sec. 36, T. 10 N., R. 3 E., at the point where the Northern Pacific Railway crosses the stream at East Helena, Mont. The only important tributaries entering Prickly Pear Creek above the station are McClellan and Lump Gulch creeks; Tenmile and Silver creeks come in below.

Records available.—July 18, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff fastened to piling on the Northern Pacific Railway bridge; datum unchanged.

Channel.—Rocky, clean, and nonshifting.

Discharge measurements.—Made from a highway bridge near the railway bridge or by wading just below the gage.

Diversions.—All the normal flow of Prickly Pear Creek is used for irrigation, the greater part of the water being diverted below the station.

Accuracy.—The bed of the stream is so extremely rough that discharge measurements are difficult, even in low water. Fair results have, however, been obtained.

Discharge measurements of Prickly Pear Creek at East Helena, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 26[a]	B. E. Jones	0.99	35	Apr. 26	B. E. Jones	1.03	38
Feb. 14	.....do	0.93	31	26	.....do	1.04	36
Mar. 7	.....do	1.10	48	July 18	.....do	1.12	50
20	.....do	1.15	60	Sept. 26	R. Richards	0.95	33
30	.....do	1.08	50	Oct. 24	B. E. Jones	1.06	42

[a] Ice at gage.

Daily gage height, in feet, of Prickly Pear Creek at East Helena, Mont., for 1911.

[R. T. Ray, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1.1	1.0	1.6	1.5	1.05	0.9	0.9	0.95
2	....	1.1	.95	1.9	1.4	1.1	.9	.9	.95
3	....	1.0	.95	1.9	1.35	1.05	.9	.9	.95
4	....	1.0	1.0	1.95	1.35	1.05	.9	.9	.95
5	....	1.0	1.1	2.0	1.3	1.1	1.0	.9	.9
6	....	.85	1.3	1.85	1.25	1.1	1.0	.95	.9
7	....	.85	1.2	2.0	1.2	1.1	.95	.95	.9
8	....	1.0	1.15	2.0	1.15	1.0	.95	.95	.9
9	....	1.05	1.15	1.95	1.15	1.05	.95	.95	....
10	....	1.05	1.1	1.9	1.15	1.05	.95	.95	....
11	....	1.05	1.15	1.85	1.15	1.0	.9	1.2	....
12	....	.9	1.15	1.8	1.15	1.0	.9	1.2	....
13	....	1.0	1.15	1.8	1.15	1.0	.95	1.1	....
14	....	1.0	1.15	1.85	1.1	1.0	.95	1.1	....
15	....	.95	1.3	1.8	1.1	1.0	.95	1.1	....
16	....	1.0	1.35	1.7	1.1	1.0	.95	1.1	....
17	....	1.0	1.35	1.65	1.1	.95	.95	1.05	....
18	....	1.0	1.3	1.7	1.1	.95	.95	1.05	....
19	....	1.0	1.2	1.7	1.1	.95	.95	1.05	....
20	....	.95	1.25	1.65	1.1	.95	.9	1.05	....
21	....	1.0	1.25	1.55	1.1	.95	.9	1.05	....
22	1.50	1.05	1.15	1.5	1.1	.95	.9	1.05	....
23	1.40	1.1	1.2	1.5	1.1	.95	.95	1.05	....
24	1.20	1.05	1.3	1.45	1.1	.95	.95	1.05	....
25	1.00	1.0	1.3	1.4	1.1	.95	.95	1.05	....
26	1.10	.95	1.35	1.4	1.1	.95	.95	1.0	....
27	1.10	1.3	1.4	1.35	1.05	.95	.95	.95	....
28	1.10	1.1	1.4	1.35	1.05	.95	.9	.95	....
29	1.10	1.0	1.35	1.35	1.0	.9	.9	.95	....
30	1.10	.95	1.4	1.45	.95	.9	.9	.95	....
31	1.10	....	1.5	....	.95	.9	....	.95	....

Daily discharge, in second-feet, of Prickly Pear Creek at East Helena, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	32	51	37	168	140	44	26	26	32
2	34	51	32	257	112	51	26	26	32
3	36	37	32	257	100	44	26	26	32
4	38	37	37	272	100	44	26	26	32
5	41	37	51	288	88	51	37	26	26
6	45	23	88	242	78	51	37	32	26
7	48	23	68	288	68	51	32	32	26
8	49	37	60	288	60	37	32	32	26
9	50	44	60	272	60	44	32	32	....
10	51	44	51	257	60	44	32	32	....
11	52	44	60	242	60	37	26	68	....
12	53	26	60	227	60	37	26	68	....
13	54	37	60	227	60	37	32	51	....
14	55	37	60	242	51	37	32	51	....
15	56	32	88	227	51	37	32	51	....
16	57	37	100	197	51	37	32	51	....
17	58	37	100	182	51	32	32	44	....
18	59	37	88	197	51	32	32	44	....
19	60	37	68	197	51	32	32	44	....
20	60	32	78	182	51	32	26	44	....
21	100	37	78	154	51	32	26	44	....
22	140	44	60	140	51	32	26	44	....
23	112	51	68	140	51	32	32	44	....
24	68	44	88	126	51	32	32	44	....
25	37	37	88	112	51	32	32	44	....
26	51	32	100	112	51	32	32	37	....
27	51	88	112	100	44	32	32	32	....
28	51	51	112	100	44	32	26	32	....
29	51	37	100	100	37	26	26	32	....
30	51	32	112	126	32	26	26	32	....
31	51	....	140	....	32	26	....	32	....

NOTE.—Daily discharge determined from a rating curve well defined below 90 second-feet.

Monthly discharge of Prickly Pear River near East Helena, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 35	2,150	D.
February			[a] 31	1,720	D.
March	140	32	56.5	3,470	C.
April	88	23	39.8	2,370	A.
May	140	32	75.4	4,640	A.
June	288	100	197	11,700	B.
July	140	32	61.2	3,760	A.
August	51	26	36.9	2,270	A.
September	37	26	29.9	1,780	A.
October	68	26	39.5	2,430	A.
November			26.1	1,550	C.
December			[a] 25	1,540	D.
The year	288		54.4	39,400	

[a] Estimated.

NOTE.—Discharge Mar. 1 to 21 estimated; Nov. 9 to 30 estimated as 25 second-feet per day.

LUMP GULCH CREEK NEAR CLANCY, MONT.

Location.—In sec. 4, T. 8 N., R. 3 W., at the ranch of Charles Zastron, 1 mile from Clancy, 15 miles from Helena, and half a mile above the junction of the creek with Prickly Pear Creek.

Records available.—July 15, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff; on left bank directly south of observer's house. A new gage was set October 12, 1910, at the original site but at a datum 1.0 foot lower than that previously used. All gage heights for 1910 were reduced to new datum.

Channel.—Gravelly, unclean, and shifting.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—The water of Lump Gulch Creek has been extensively used for placer mining. At present the creek furnishes some water for irrigation, but the valley is narrow and affords but little irrigable land. The normal flow of the stream is appropriated.

Accuracy.—Data not entirely satisfactory; no flood records have been obtained.

Discharge measurements of Lump Gulch Creek near Clancy, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 1	B. E. Jones	1.47	23
July 20	.....do	1.12	3

Daily gage height, in feet, of Lump Gulch Creek near Clancy, Mont., for 1911.

[Charles Zastron, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1.45	1.5	1.45	1.45	1.0	1.1	1.2	1.2
2	....	1.4	1.5	1.45	1.45	1.0	1.1	1.2	1.2
3	....	1.4	1.5	1.45	1.45	1.1	1.1	1.2	1.2
4	....	1.4	1.55	1.45	1.45	1.1	1.2	1.2	1.2
5	....	1.45	1.6	1.6	1.4	1.15	1.2	1.2	1.2
6	....	1.4	1.55	1.65	1.35	1.15	1.2	1.2	1.2
7	....	1.45	1.45	1.85	1.35	1.15	1.2	1.2	1.2
8	....	1.45	1.45	1.85	1.35	1.15	1.2	1.2	1.2
9	....	1.45	1.45	1.95	1.3	1.15	1.2	1.2	....
10	....	1.5	1.5	2.0	1.25	1.15	1.2	1.2	....
11	....	1.4	1.45	1.95	1.25	1.15	1.2	1.2	....
12	1.25	1.4	1.45	1.95	1.25	1.15	1.2	1.2	....
13	1.25	1.35	1.45	1.85	1.25	1.1	1.2	1.2	....
14	1.25	1.35	1.4	1.85	1.15	1.1	1.2	1.2	....
15	1.3	1.4	1.45	1.8	1.2	1.1	1.2	1.2	....
16	1.3	1.35	1.4	1.75	1.15	1.1	1.2	1.2	....
17	1.35	1.35	1.4	1.65	1.15	1.1	1.2	1.2	....
18	1.35	1.35	1.4	1.65	1.15	1.1	1.2	1.2	....
19	1.4	1.4	1.4	1.55	1.15	1.1	1.2	1.2	....
20	1.45	1.45	1.45	1.6	1.1	1.1	1.2	1.2	....
21	1.4	1.4	1.35	1.55	1.1	1.1	1.2	1.2	....
22	1.45	1.45	1.4	1.55	1.1	1.1	1.2	1.2	....
23	1.45	1.45	1.4	1.45	1.1	1.1	1.2	1.2	....
24	1.45	1.45	1.45	1.45	1.1	1.1	1.2	1.2	....
25	1.5	1.5	1.5	1.5	1.1	1.1	1.2	1.2	....
26	1.45	1.5	1.45	1.45	1.1	1.1	1.2	1.2	....
27	1.45	1.5	1.45	1.45	1.1	1.1	1.2	1.2	....
28	1.45	1.5	1.45	1.45	1.0	1.1	1.2	1.2	....
29	1.45	1.5	1.45	1.45	1.0	1.1	1.2	1.2	....
30	1.5	1.55	1.5	1.5	1.0	1.1	1.2	1.2	....
31	1.45	....	1.45	....	1.0	1.1	....	1.2	....

Daily discharge, in second-feet, of Lump Gulch Creek near Clancy, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	22	25	22	16	0.8	2.6	5.0	5.0
2	....	20	25	22	16	.8	2.6	5.0	5.0
3	....	20	25	22	16	2.6	2.6	5.0	5.0
4	....	20	28	22	16	2.6	5.0	5.0	5.0
5	....	22	30	30	14	3.8	5.0	5.0	5.0
6	....	20	28	32	12	3.8	5.0	5.0	5.0
7	....	22	22	43	12	3.8	5.0	5.0	5.0
8	....	22	22	43	12	3.8	5.0	5.0	5.0
9	....	22	22	49	9	3.8	5.0	5.0	....
10	....	25	25	52	7	3.8	5.0	5.0	....
11	....	20	22	49	7	3.8	5.0	5.0	....
12	13	20	22	49	7	3.8	5.0	5.0	....
13	13	18	22	40	7	2.6	5.0	5.0	....
14	13	18	20	40	3.8	2.6	5.0	5.0	....
15	15	20	22	37	5.0	2.6	5.0	5.0	....
16	15	18	20	34	3.8	2.6	5.0	5.0	....
17	18	18	20	28	3.8	2.6	5.0	5.0	....
18	18	18	20	28	3.8	2.6	5.0	5.0	....
19	20	20	20	22	3.8	2.6	5.0	5.0	....
20	22	22	22	25	2.6	2.6	5.0	5.0	....
21	20	20	18	22	2.6	2.6	5.0	5.0	....
22	22	22	20	22	2.6	2.6	5.0	5.0	....
23	22	22	20	16	2.6	2.6	5.0	5.0	....
24	22	22	22	16	2.6	2.6	5.0	5.0	....
25	25	25	25	19	2.6	2.6	5.0	5.0	....
26	22	25	22	16	2.6	2.6	5.0	5.0	....
27	22	25	22	16	2.6	2.6	5.0	5.0	....
28	22	25	22	16	.8	2.6	5.0	5.0	....
29	22	25	22	16	.8	2.6	5.0	5.0	....
30	25	28	25	19	.8	2.6	5.0	5.0	....
31	22	....	22	....	.8	2.6	....	5.0	....

NOTE.—Daily discharge determined from two poorly defined rating curves.

Monthly discharge of Lump Gulch Creek near Clancy, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a] 3.00	184	
February	....	....	[a] 3.00	167	
March	25	....	15.1	928	C.
April	28	18	21.5	1,280	C.
May	30	18	22.6	1,390	C.
June	52	16	28.9	1,720	C.
July	16	.8	6.42	395	C.
August	3.8	.8	2.79	172	C.
September	5.0	2.6	4.76	283	C.
October	5.0	5.0	5.00	307	C.
November	....	....	5.00	298	C.
December	....	....	[a] 3.50	215	
The year	....	....	10.1	7,340	

[a] Estimated.

NOTE.—Mar. 1 to 11 estimated as 7.0 second-feet per day; Nov. 9 to 30 estimated as 5.0 second-feet per day.

TENMILE CREEK NEAR HELENA, MONT.

Location.—In SW. ¼ S. E. ¼ sec. 22, T. 10 N., R. 4 W., opposite the Broadwater Hotel, near Helena, Mont.

Records available.—July 8, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff, on right bank; datum unchanged.

Channel.—Shifts somewhat during flood stages.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—Part of the water supply for the city of Helena is taken from Tenmile Creek above the station. Two irrigation ditches also take water from the creek above the gage. The entire low-water flow is appropriated and used before it reaches the mouth of the creek.

Accuracy.—At low and medium stages conditions favor accurate determination of discharge.

Discharge measurements of Tenmile Creek near Helena, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 26	B. E. Jones	1.66	5.4	Apr. 25	B. E. Jones	2.37	32
Feb. 14	.....do	1.76	7.1	May 1	.....do	2.40	37
Mar. 7	.....do	[a] 1.60	4.4	26	.....do	2.76	74
31	.....do	2.12	17.0	July 18	.....do	1.81	6.5
31	.....do	2.12	17.2	Sept. 27	R. Richards	1.71	5.4

[a] Ice conditions.

Daily gage height, in feet, of Tenmile Creek near Helena, Mont., for 1911.

[J. W. Jackson, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	2.2	2.45	3.5	3.3	1.45	1.35	1.7	2.3
2	2.25	2.45	3.7	3.0	1.45	1.35	1.75	2.3
3	2.15	2.45	3.8	2.85	1.7	1.35	1.95	2.2
4	2.1	2.55	3.85	2.8	1.75	1.45	1.8	2.2
5	2.05	2.8	3.8	2.75	1.85	1.4	1.8	2.25
6	2.05	3.2	3.6	2.65	1.8	1.45	1.8	2.3
7	2.1	3.0	3.65	2.6	1.95	1.45	1.75	2.3
8	2.05	2.9	3.65	2.5	1.6	1.55	1.8	2.3
9	2.15	2.95	3.6	2.45	1.65	1.7	1.8	....
10	2.2	2.8	3.5	2.4	1.65	1.8	1.8	....
11	2.15	2.8	3.4	2.3	1.6	1.8	2.15	....
12	2.0	2.8	3.3	2.2	1.6	1.7	2.15	....
13	2.0	2.8	3.2	2.1	1.55	1.7	2.15	....
14	2.0	2.8	3.25	2.05	1.5	1.7	2.15	....
15	2.0	3.0	3.05	1.9	1.5	1.65	2.15	....
16	2.0	3.0	3.0	1.9	1.45	1.7	2.15	....
17	2.15	3.05	2.9	1.85	1.45	1.7	2.25	....
18	2.15	3.0	2.7	1.9	1.4	1.7	2.2	....
19	2.2	2.9	2.6	1.85	1.4	1.7	2.1	....
20	2.2	2.75	2.7	1.8	1.4	1.7	2.1	....
21	2.3	2.7	2.85	1.75	1.4	1.7	2.1	....
22	2.4	2.65	2.7	1.75	1.4	1.7	2.1	....
23	2.35	2.7	2.6	1.65	1.35	1.7	2.0	....
24	2.3	2.9	2.8	1.55	1.4	1.7	2.0	....
25	2.4	2.9	2.6	1.5	1.35	1.75	2.0	....
26	2.6	2.8	2.55	1.65	1.35	1.75	1.9	....
27	2.8	2.8	2.5	1.7	1.4	1.75	2.0	....
28	2.65	2.8	2.55	1.65	1.4	1.7	2.3	....
29	2.6	2.85	2.5	1.6	1.35	1.7	2.35	....
30	2.5	2.9	2.6	1.55	1.35	1.7	2.4	....
31	....	3.2	....	1.6	1.35	....	2.3	....

Daily discharge, in second-feet, of Tenmile Creek near Helena, Mont., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	22	42	178	148	1.2	.6	4.3	29
2	26	42	208	104	1.2	.6	5.4	29
3	20	42	223	85	4.3	.6	10	22
4	17	51	230	79	5.4	1.2	6.4	22
5	14	79	223	73	7.7	.8	6.4	26
6	14	133	193	62	6.4	1.2	6.4	29
7	17	104	200	56	10	1.2	5.4	29
8	14	91	200	46	2.7	2.1	6.4	29
9	20	98	193	42	3.5	4.3	6.4	....
10	22	79	178	37	3.5	6.4	6.4	....
11	20	79	163	29	2.7	6.4	20	....
12	12	79	148	22	2.7	4.3	20	....
13	12	79	133	17	2.1	4.3	20	....
14	12	79	140	14	1.5	4.3	20	....
15	12	104	111	9.0	1.5	3.5	20	....
16	12	104	104	9.0	1.2	4.3	20	....
17	20	111	91	7.7	1.2	4.3	26	....
18	20	104	67	9.0	.8	4.3	22	....
19	22	91	56	7.7	.8	4.3	17	....
20	22	73	67	6.4	.8	4.3	17	....
21	29	67	85	5.4	.8	4.3	17	....
22	37	62	67	5.4	.8	4.3	17	....
23	33	67	56	3.5	.6	4.3	12	....
24	29	91	79	2.1	.8	4.3	12	....
25	37	91	56	1.5	.6	5.4	12	....
26	56	79	51	3.5	6	5.4	9.0	....
27	79	79	46	4.3	.8	5.4	12	....
28	62	79	51	3.5	.8	4.3	29	....
29	56	85	46	2.7	.6	4.3	33	....
30	46	91	56	2.1	.6	4.3	37	....
31	....	133	....	2.7	.6	....	29	....

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of Tenmile Creek near Helena, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a] 5.0	307	D.
February	....	....	[a] 6.0	333	D.
March	....	....	[a] 11.0	676	D.
April	79	12	27.1	1,610	B.
May	133	42	83.5	5,130	C.
June	230	46	123	7,320	C.
July	148	1.5	29	1,780	B.
August	10	.6	2.22	136	B.
September	6.4	.6	3.65	217	B.
October	37	4.3	15.6	959	B.
November	....	....	[a] 15	893	D.
December	....	....	[a] 9	553	D.
The year	....	....	....	19,900	

[a] Estimated.

SEVENMILE CREEK AT BIRDSEYE, MONT.

Location.—At Richard Tobin's ranch, one-fourth mile from Birdseye, Mont.

Records available.—March 27, 1909, to December 31, 1911. From July 16, 1908, to August 26, 1908, a station was maintained on this stream at Dr. Head's ranch, near Helena.

Drainage area.—Not measured.

Gage.—Staff.

Channel.—Sandy and shifting.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—Entire flow of creek is appropriated and used for irrigation.

Discharge measurements of Sevenmile Creek at Birdseye, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 7	B. E. Jones	(a)	5.9
21	....do	2.34	8.5
July 18	....do	2.17	3.2

a Three feet of snow at gage.

Daily gage height, in feet, of Sevenmile Creek at Birdseye, Mont., for 1911.

[R. Tobin, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		2.25	2.1	2.3	2.5	2.3	2.0	2.0	2.3
2		2.2	2.1	2.3	2.5	2.3	2.0	2.1	2.3
3		2.2	2.0	2.3	2.45	2.3	2.0	2.05	2.35
4		2.2	2.0	2.35	2.4	2.2	2.0	2.0	2.4
5		2.15	1.95	2.45	2.25	2.15	1.95	1.95	2.35
6		2.2	2.0	2.5	2.3	2.2	2.0	2.0	
7		2.2	2.0	2.5	2.3	2.2	2.0	2.0	
8		2.2	2.0	2.5	2.3	2.2	2.0	2.0	
9		2.2	2.3	2.5	2.3	2.2	2.0	2.0	
10		2.15	2.25	2.45	2.25	2.15	1.85	2.0	
11		2.2	2.3	2.4	2.3	2.2	1.95	2.1	
12		2.2	2.3	2.4	2.3	2.2	2.0	2.3	
13		2.2	2.3	2.35	2.3	2.2	2.0	2.3	
14		2.2	2.3	2.3	2.25	2.2	2.1	2.3	
15		2.15	2.25	2.25	2.2	2.15	2.05	2.1	
16		2.2	2.4	2.3	2.2	2.2	2.1	2.0	
17		2.15	2.4	2.3	2.2	2.1	2.0	2.0	
18		2.1	2.35	2.3	2.35	2.1	2.0	2.0	
19		2.1	2.35	2.4	2.2	2.1	2.0	2.0	
20		2.05	2.3	2.4	2.15	2.05	1.95	1.95	
21	2.30	2.1	2.35	2.5	2.2	2.1	2.1	2.15	
22	2.20	2.1	2.35	2.6	2.2	2.05	2.1	2.1	
23	2.20	2.1	2.35	2.6	2.2	2.0	2.1	2.1	
24	2.20	2.1	2.35	2.6	2.2	2.0	2.05	2.1	
25	2.15	2.05	2.25	2.55	2.15	1.95	1.95	2.05	
26	2.30	2.1	2.3	2.6	2.2	2.0	2.0	2.2	
27	2.20	2.1	2.3	2.5	2.3	2.0	2.0	2.3	
28	2.20	2.1	2.3	2.5	2.3	2.0	2.0	2.3	
29	2.20	2.15	2.3	2.5	2.3	2.0	2.0	2.35	
30	2.15	2.05	2.25	2.45	2.25	1.95	1.95	2.3	
31	2.20		2.3		2.3	2.0		2.3	

Daily discharge, in second-feet, of Sevenmile Creek at Birdseye, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	4.0	5.2	1.8	6.7	15	6.7	0.7	0.7	6.7
2	4.0	3.8	1.8	6.7	15	6.7	.7	1.8	6.7
3	4.0	3.8	.7	6.7	13	6.7	.7	1.2	8.6
4	5.0	3.8	.7	8.6	10	3.8	.7	.7	10
5	5.0	2.8	.4	13	5.2	2.8	.4	.4	8.6
6	5.0	3.8	.7	15	6.7	3.8	.7	.7	....
7	5.9	3.8	.7	15	6.7	3.8	.7	.7	....
8	6.0	3.8	.7	15	6.7	3.8	.7	.7	....
9	6.0	3.8	6.7	15	6.7	3.8	.7	.7	....
10	6.0	2.8	5.2	13	5.2	2.8	.1	.7	....
11	6.0	3.8	6.7	10	6.7	3.8	.4	1.8	....
12	6.0	3.8	6.7	10	6.7	3.8	.7	6.7	....
13	6.0	3.8	6.7	8.6	6.7	3.8	.7	6.7	....
14	6.5	3.8	6.7	6.7	5.2	3.8	1.8	6.7	....
15	6.5	2.8	5.2	5.2	3.8	2.8	1.2	1.8	....
16	6.5	3.8	10	6.7	3.8	3.8	1.8	.7	....
17	6.5	2.8	10	6.7	3.8	1.8	.7	.7	....
18	6.5	1.8	8.6	6.7	8.6	1.8	.7	.7	....
19	6.5	1.8	8.6	10	3.8	1.8	.7	.7	....
20	6.5	1.2	6.7	10	2.8	1.2	.4	.4	....
21	6.7	1.8	8.6	15	3.8	1.8	1.8	2.8	....
22	3.8	1.8	8.6	20	3.8	1.2	1.8	1.8	....
23	3.8	1.8	8.6	20	3.8	.7	1.8	1.8	....
24	3.8	1.8	8.6	20	3.8	.7	1.2	1.8	....
25	2.8	1.2	5.2	18	2.8	.4	.4	1.2	....
26	6.7	1.8	6.7	20	3.8	.7	.7	3.8	....
27	3.8	1.8	6.7	15	6.7	.7	.7	6.7	....
28	3.8	1.8	6.7	15	6.7	.7	.7	6.7	....
29	3.8	2.8	6.7	15	6.7	.7	.7	8.6	....
30	2.8	1.2	5.2	13	5.2	.4	.4	6.7	....
31	3.8	....	6.7	....	6.7	.7	....	6.7	....

NOTE.—Daily discharge determined from a rating curve that is poorly defined. Discharge estimated Mar. 1 to 6 and 8 to 20.

Monthly discharge of Sevenmile Creek at Birdseye, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a] 3.0	184	
February	....	....	[a] 3.0	167	
March	6.7	2.8	5.16	317	D.
April	5.2	1.2	2.82	168	C.
May	10	.4	5.60	344	C.
June	20	5.2	12.2	726	C.
July	15	2.8	6.32	389	C.
August	6.7	.4	2.64	162	C.
September	1.8	.4	.85	51	C.
October	8.6	.4	2.70	166	C.
November	....	....	[a] 5.0	298	
December	....	....	[a] 3.0	184	
The year	20	....	4.36	3,160	

[a] Estimated.

LITTLE PRICKLY PEAR CREEK BASIN.

LITTLE PRICKLY PEAR CREEK NEAR MARYSVILLE, MONT.

Location.—In NW. ¼ NW. ¼ sec. 24, T. 12 N., R. 7 W., at the Pearce ranch, 6 miles west and 3 miles north of Marysville, Mont.

Records available.—May 18, 1909, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff; datum unchanged.

Channel.—Shifts in high water.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—Many small ditches take water from the stream, practically the entire flow being appropriated.

Discharge measurements of Little Prickly Pear Creek near Marysville, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 18	C. S. Heidel	3.02	22
July 20	....do	2.74	11

Daily gage height, in feet, of Little Prickly Pear Creek near Marysville, Mont., for 1911.

[Gertrude P. Johnson, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2.36	2.62	3.10	2.93	2.70	2.49	2.55	2.58
2	....	2.36	2.65	3.15	2.93	2.70	2.49	2.55	2.58
3	....	2.36	2.67	3.15	2.93	2.70	2.55	2.55	2.58
4	....	2.36	2.68	3.20	2.91	2.70	2.55	2.55	2.58
5	....	2.36	2.68	3.23	2.91	2.70	2.55	2.55	2.58
6	....	2.36	3.00	3.25	2.90	2.70	2.62	2.55	2.57
7	....	2.36	3.02	3.22	2.90	2.68	2.62	2.55	2.57
8	2.28	2.36	2.98	3.20	2.90	2.68	2.62	2.55	2.56
9	2.28	2.38	2.95	3.20	2.90	2.67	2.62	2.55	2.55
10	2.28	2.38	2.90	3.20	2.90	2.65	2.62	2.55	2.55
11	2.28	2.40	2.85	3.15	2.88	2.65	2.60	2.55	2.55
12	2.28	2.40	2.82	3.13	2.85	2.65	2.60	2.55	....
13	2.28	2.43	2.82	3.08	2.82	2.65	2.58	2.55	....
14	2.29	2.43	2.91	3.05	2.80	2.65	2.58	2.55	....
15	2.30	2.44	2.95	3.00	2.80	2.63	2.58	2.55	....
16	2.30	2.44	2.98	3.00	2.80	2.63	2.58	2.55	....
17	2.31	2.44	3.00	3.00	2.80	2.58	2.58	2.60	....
18	2.31	2.44	3.00	3.00	2.80	2.58	2.57	2.60	....
19	2.31	2.45	2.95	3.00	2.80	2.58	2.57	2.60	....
20	2.32	2.45	2.90	3.00	2.72	2.58	2.56	2.60	....
21	2.32	2.46	2.90	2.95	2.72	2.58	2.56	2.60	....
22	2.34	2.46	2.85	2.95	2.72	2.58	2.56	2.60	....
23	2.35	2.47	2.85	3.00	2.72	2.58	2.56	2.60	....
24	2.35	2.47	2.85	3.05	2.72	2.56	2.56	2.60	....
25	2.35	2.49	2.88	3.00	2.72	2.55	2.56	2.60	....
26	2.35	2.49	2.88	2.98	2.72	2.55	2.56	2.60	....
27	2.35	2.49	2.90	2.98	2.72	2.55	2.55	2.59	....
28	2.36	2.51	2.95	2.95	2.70	2.55	2.55	2.58	....
29	2.36	2.52	3.00	2.93	2.70	2.55	2.55	2.58	....
30	2.36	2.60	3.05	2.93	2.70	2.49	2.55	2.58	....
31	2.36	....	3.05	....	2.70	2.49	....	2.58	....

Daily discharge, in second-feet, of Little Prickly Pear Creek near Marysville, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.5	2.4	8.0	25	18	10	4.8	6.2	6.9
2	1.5	2.4	8.8	27	18	10	4.8	6.2	6.9
3	1.4	2.4	9.4	27	18	10	6.2	6.2	6.9
4	1.4	2.4	9.7	28	17	10	6.2	6.2	6.9
5	1.3	2.4	9.7	30	17	10	6.2	6.2	6.9
6	1.3	2.4	21	30	17	10	8.0	6.2	6.7
7	1.2	2.4	21	29	17	9.7	8.0	6.2	6.7
8	1.2	2.4	20	28	17	9.7	8.0	6.2	6.4
9	1.2	2.7	19	28	17	9.4	8.0	6.2	6.2
10	1.2	2.7	17	28	17	8.8	8.0	6.2	6.2
11	1.2	3.0	15	27	16	8.8	7.4	6.2	6.2
12	1.2	3.0	14	26	15	8.8	7.4	6.2	....
13	1.2	3.6	14	24	14	8.8	6.9	6.2	....
14	1.4	3.6	17	23	14	8.8	6.9	6.2	....
15	1.5	3.8	19	21	14	8.3	6.9	6.2	....
16	1.5	3.8	20	21	14	8.3	6.9	6.2	....
17	1.6	3.8	21	21	14	6.9	6.9	7.4	....
18	1.6	3.8	21	21	14	6.9	6.7	7.4	....
19	1.6	4.0	19	21	14	6.9	6.7	7.4	....
20	1.8	4.0	17	21	11	6.9	6.4	7.4	....
21	1.8	4.2	17	19	11	6.9	6.4	7.4	....
22	2.1	4.2	15	19	11	6.9	6.4	7.4	....
23	2.2	4.4	15	21	11	6.9	6.4	7.4	....
24	2.2	4.4	15	23	11	6.4	6.4	7.4	....
25	2.2	4.8	16	21	11	6.2	6.4	7.4	....
26	2.2	4.8	16	20	11	6.2	6.4	7.4	....
27	2.2	4.8	17	20	11	6.2	6.2	7.2	....
28	2.4	5.2	19	19	10	6.2	6.2	6.9	....
29	2.4	5.5	21	18	10	6.2	6.2	6.9	....
30	2.4	7.4	23	18	10	4.8	6.2	6.9	....
31	2.4	....	23	....	10	4.8	....	6.9	....

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge estimated Mar. 1 to 7.

Monthly discharge of Little Prickly Pear Creek near Marysville, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a] 2.5	154	
February	....	....	[a] 1.5	83	
March	2.4	1.2	1.70	104	C.
April	7.4	2.4	3.69	220	B.
May	23	8.0	16.7	1,030	B.
June	30	18	23.5	1,400	B.
July	18	10	13.9	855	B.
August	10	4.8	7.89	485	B.
September	8.0	4.8	6.68	397	B.
October	7.4	6.2	6.71	413	B.
November	....	....	[a] 5.5	327	D.
December	....	....	[a] 5.0	307	
The year	....	....	7.94	5,780	

[a] Estimated.

LITTLE PRICKLY PEAR CREEK NEAR CANYON CREEK, MONT.

Location.—Near Canyon Creek post office, Mont. Principal tributaries above the station are Canyon, Marsh, Lost Horse, and Deadman creeks.

Records available.—April 1, 1909, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff; datum unchanged.

Channel.—Permanent at ordinary stages; will shift at flood stages.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—Many small ditches take water from this stream and the low-water flow is practically all appropriated.

Discharge measurements of Little Prickly Pear Creek near Canyon Creek, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 18	C. S. Heidel	2.85	90
July 20	do	1.72	1.8

Daily gage height, in feet, of Little Prickly Pear Creek near Canyon Creek, Mont., for 1911.

[W. J. Carbis, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		2.4	2.7	3.1	1.9	1.7	2.1
2		2.5	2.65	3.0	1.9	1.7	2.1
3		2.4	2.65	3.0	1.8	1.7	2.1
4		2.4	2.6	2.9	1.9	1.7	2.2
5		2.5	2.65	2.9	1.9	1.7	2.2
6		2.5	2.65	2.9	1.8	1.8	2.25
7	2.2	2.45	2.75	3.0	1.8	1.85	2.25
8	2.1	2.45	2.75	3.0	1.8	1.9	2.3
9	2.1	2.4	2.65	2.9	1.9	1.9	2.3
10	2.1	2.4	2.7	2.8	1.9	1.9	2.3
11	2.1	2.34	2.75	2.8	1.8	1.9	2.3
12	2.1	2.34	2.75	2.7	1.8	1.9	2.3
13	2.2	2.34	2.75	2.6	1.8	1.9	2.2
14	2.25	2.35	2.75	2.6	1.8	2.0	2.2
15	2.3	2.35	2.8	2.4	1.8	2.1	2.3
16	2.35	2.35	2.8	2.4	1.8	2.1	2.4
17	2.4	2.35	2.8	2.4	1.8	2.1	2.4
18	2.3	2.4	2.8	2.3	1.8	2.0	2.4
19	2.3	2.4	2.8	2.3	1.7	2.0	2.4
20	2.3	2.4	2.9	2.3	1.7	2.0	2.5
21	2.3	2.5	2.9	2.2	1.7	1.9	2.5
22	2.4	2.65	2.8	2.2	1.6	1.9	2.4
23	2.5	2.65	2.8	2.2	1.6	1.8	2.4
24	2.5	2.7	2.85	2.15	1.6	1.8	2.3
25	2.4	2.7	2.8	2.15	1.6	1.7	2.3
26	2.3	2.75	2.85	2.1	1.6	1.8	2.3
27	2.35	2.65	2.9	2.1	1.6	1.8	2.3
28	2.4	2.65	2.9	2.1	1.7	1.9	2.2
29	2.4	2.65	3.0	2.15	1.6	2.0	2.2
30	2.5	2.7	3.0	2.2	1.6	2.0	2.2
31	2.5		3.0		1.6	2.0	

Daily discharge, in second-feet, of Little Prickly Pear Creek near Canyon Creek, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	15	35	67	129	5.0	1.5	13
2	15	44	61	111	5.0	1.5	13
3	16	35	61	111	3.0	1.5	13
4	16	35	55	95	5.0	1.5	20
5	17	44	61	95	5.0	1.5	20
6	17	44	61	95	3.0	3.0	24
7	20	40	74	111	3.0	4.0	24
8	13	40	74	111	3.0	5.0	27
9	13	35	61	95	5.0	5.0	27
10	13	35	67	81	5.0	5.0	27
11	13	30	74	81	3.0	5.0	27
12	13	30	74	67	3.0	5.0	27
13	20	30	74	55	3.0	5.0	20
14	24	31	74	55	3.0	8.0	20
15	27	31	81	35	3.0	13	27
16	31	31	81	35	3.0	13	35
17	35	31	81	35	3.0	13	35
18	27	35	81	27	3.0	8.0	35
19	27	35	81	27	1.5	8.0	35
20	27	35	95	27	1.5	8.0	44
21	27	44	95	20	1.5	5.0	44
22	35	61	81	20	0	5.0	35
23	44	61	81	20	0	3.0	35
24	44	67	88	16	0	3.0	27
25	35	67	81	16	0	1.5	27
26	27	74	88	13	0	3.0	27
27	31	61	95	13	0	3.0	27
28	35	61	95	13	1.5	5.0	20
29	35	61	111	16	0	8.0	20
30	44	67	111	20	0	8.0	20
31	44	....	111	....	0	8.0	....

NOTE.—Daily discharge determined from a fairly well-defined rating curve. Discharge estimated Mar. 1 to 6.

Monthly discharge of Little Prickly Pear Creek near Canyon Creek, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 18	1,110	D.
February			[a] 15	833	D.
March	44	13	25.8	1,590	B.
April	74	30	44.3	2,640	B.
May	111	55	79.8	4,910	B.
June	129	13	54.8	3,260	B.
July	5.0	.0	2.32	143	B.
August	13	1.5	5.42	333	B.
September	44	13	26.5	1,580	B.
October			[a] 20	1,230	D.
November			[a] 15	893	D.
December			[a] 12	738	D.
The year			26.6	19,300	

[a] Estimated.

DEADMAN CREEK NEAR MARYSVILLE, MONT.

Location.—Near the ranch of Charles Johnson, half a mile above the junction of Deadman Creek with Lost Horse Creek, and 6 miles from Marysville, Mont.

Records available.—April 2, 1909, to June 30, 1911.

Drainage area.—Not measured.

Gage.—Staff. The staff gage was moved to a point 300 yards below the original site on June 8, 1909, and was established at a new datum.

Channel.—Probably permanent.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—One or two small ditches take water from the stream.

Discharge measurements of Deadman Creek near Marysville, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 18	C. S. Heidel	2.51	36.3
July 20	.....do	2.11	10.3

Daily gage height, in feet, and discharge, in second-feet, of Deadman Creek near Marysville, Mont., for 1911.

[Chas. Johnson, observer.]

Day.	March.		April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	....	4.0	2.10	10	2.52	38	2.42	30
2	....	4.0	2.10	10	2.52	38	2.45	32
3	....	4.0	2.12	11	2.57	42	2.45	32
4	....	4.0	2.12	11	2.60	45	2.45	32
5	....	3.9	2.12	11	2.65	50	2.49	35
6	....	3.9	2.12	11	2.67	52	2.52	38
7	....	3.9	2.12	11	2.67	52	2.55	40
8	....	3.8	2.10	10	2.67	52	2.54	40
9	....	3.8	2.07	8.8	2.72	57	2.52	38
10	....	3.8	2.10	10	2.72	57	2.52	38
11	....	3.7	2.12	11	2.70	55	2.52	38
12	....	3.7	2.07	8.8	2.67	52	2.52	38
13	1.92	3.6	2.07	8.8	2.67	52	2.52	38
14	1.92	3.6	2.07	8.8	2.64	49	2.51	37
15	1.97	5.1	2.07	8.8	2.62	47	2.50	36
16	1.97	5.1	2.12	11	2.61	46	2.50	36
17	2.00	6.0	2.12	11	2.55	40	2.50	36
18	2.00	6.0	2.14	12	2.50	36	2.50	36
19	2.07	8.8	2.17	14	2.49	35	2.50	36
20	2.05	8.0	2.17	14	2.48	34	2.48	34
21	2.10	10	2.22	16	2.48	34	2.45	32
22	2.10	10	2.22	16	2.48	34	2.45	32
23	2.10	10	2.27	19	2.46	33	2.45	32
24	2.07	8.8	2.27	19	2.46	33	2.42	30
25	2.07	8.8	2.31	22	2.45	32	2.42	30
26	2.10	10	2.35	24	2.45	32	2.44	31
27	2.07	8.8	2.40	28	2.45	32	2.45	32
28	2.05	8.0	2.42	30	2.45	32	2.45	32
29	2.05	8.0	2.47	34	2.45	32	2.45	32
30	2.10	10	2.47	34	2.42	30	2.45	32
31	2.10	10	....	....	2.42	30	....	....

NOTE.—Daily discharge determined from a poorly defined rating curve. Discharge Mar. 1 to 12 estimated.

Monthly discharge of Deadman Creek near Marysville, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 5.0	307	
February			[a] 4.0	222	
March	10	3.6	6.3	387	C.
April	34	8.8	15.1	898	C.
May	57	30	41.4	2,550	C.
June	40	30	34.5	2,050	C.
The period			17.9	6,410	

[a] Estimated.

LOST HORSE CREEK NEAR MARYSVILLE, MONT.

Location.—At the ranch of Charles Johnson, one-fourth mile above the junction of Lost Horse with Deadman Creek and about 6 miles from Marysville.

Records available.—April 2, 1909, to June 30, 1911.

Drainage area.—Not measured.

Gage.—Staff.

Channel.—Will shift at high stages.

Discharge measurements.—Made by wading.

Diversions.—One ditch takes water from Lost Horse Creek.

Accuracy.—Conditions favor accurate determinations of discharge at low and ordinary stages.

Discharge measurements of Lost Horse Creek near Marysville, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 18	C. S. Heidel	2.12	3.29
July 20	do	2.01	1.75

Daily gage height, in feet, and discharge, in second-feet, of Lost Horse Creek near Marysville, Mont., for 1911.

[Chas. Johnson, observer.]

Day.	April.		May.		June.		Day.	April.		May		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1		0	2.00	1.8	2.15	3.4	16	1.58	0.08	2.10	2.8	2.12	3.0
2		0	2.00	1.8	2.15	3.4	17	1.62	.12	2.12	3.0	2.12	3.0
3		0	2.00	1.8	2.15	3.4	18	1.65	.15	2.12	3.0	2.12	3.0
4		0	2.05	2.3	2.15	3.4	19	1.68	.18	2.12	3.0	2.12	3.0
5		0	2.05	2.3	2.18	3.8	20	1.71	.23	2.15	3.4	2.12	3.0
6		0	2.05	2.3	2.20	4.0	21	1.75	.35	2.15	3.4	2.10	2.8
7		0	2.05	2.3	2.20	4.0	22	1.78	.4	2.15	3.4	2.10	2.8
8		0	2.05	2.3	2.20	4.0	23	1.80	.5	2.15	3.4	2.10	2.8
9	1.50	0	2.06	2.4	2.18	3.8	24	1.81	.6	2.15	3.4	2.10	2.8
10	1.50	0	2.08	2.6	2.16	3.5	25	1.85	.8	2.18	3.8	2.10	2.8
11	1.50	0	2.08	2.6	2.15	3.4	26	1.85	.8	2.18	3.8	2.10	2.8
12	1.55	.05	2.10	2.8	2.15	3.4	27	1.90	1.0	2.18	3.8	2.11	2.9
13	1.55	.05	2.10	2.8	2.15	3.4	28	1.90	1.0	2.18	3.8	2.12	3.0
14	1.58	.08	2.10	2.8	2.12	3.0	29	1.98	1.6	2.16	3.5	2.12	3.0
15	1.58	.08	2.10	2.8	2.12	3.0	30	2.00	1.8	2.16	3.5	2.12	3.0
							31			2.16	3.5		

NOTE.—Daily discharge determined from a poorly defined rating curve. Discharge Apr. 1 to 8 estimated.

Monthly discharge of Lost Horse Creek near Marysville, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	1.8	0	0.33	20	C.
May	3.8	1.8	2.91	179	C.
June	4.0	2.8	3.22	192	C.

NOTE.—Practically no flow January and February. Records discontinued June 30.

MARSH CREEK NEAR MARYSVILLE, MONT.

Location.—In the NE. ¼ SE. ¼ sec. 6, T. 12 N., R. 6 W., at the Hartmiller ranch, about 1 mile above the junction of Marsh Creek with Little Prickly Pear Creek.

Records available.—April 1, 1909, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff.

Channel.—Shifting.

Discharge measurements.—Made by wading near gage.

Winter flow.—Affected by ice.

Diversions.—The creek supplies no important ditches.

Discharge measurements of Marsh Creek near Marysville, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 18	C. S. Heidel	1.48	2.69
July 20	do	1.40	2.54

Daily gage height, in feet, of Marsh Creek near Marysville, Mont., for 1911.

[J. Hartmiller, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		1.44	1.40	1.45	1.46	1.36	1.25		1.25
2		1.45	1.40	1.45	1.45	1.45	1.25	1.35	1.30
3		1.42	1.40	1.45	1.43	1.38	1.45	1.30	1.30
4		1.42	1.45	1.47	1.41	1.44	1.35	1.30	1.30
5		1.40	1.45	1.46	1.41	1.40	1.35	1.30	1.30
6		1.40	1.45	1.47	1.40	1.45	1.35	1.30	1.30
7		1.40	1.45	1.52	1.40	1.40	1.33	1.30	
8		1.40	1.45	1.52	1.40	1.40	1.33	1.26	
9		1.40	1.43	1.48	1.39	1.40	1.30	1.26	
10		1.40	1.43	1.46	1.40	1.36	1.25	1.25	
11		1.38	1.43	1.45	1.40	1.35	1.25	1.35	
12		1.41	1.43	1.48	1.40	1.34	1.25	1.35	
13		1.40	1.41	1.48	1.40	1.33	1.25	1.35	
14		1.36	1.41	1.48	1.40	1.32	1.25	1.35	
15		1.38	1.60	1.48	1.42	1.32	1.25	1.35	
16		1.39	1.48	1.45	1.40	1.32	1.25	1.35	
17		1.38	1.46	1.45	1.42	1.25	1.25	1.35	
18	1.36	1.39	1.46	1.40	1.44	1.25	1.25	1.35	
19	1.40	1.40	1.47	1.75	1.42	1.25	1.25	1.35	
20	1.44	1.40	1.46	1.55	1.40	1.26	1.25	1.30	
21	1.44	1.41	1.46	1.45	1.40	1.30	1.30	1.30	
22	1.45	1.40	1.45	1.42	1.40	1.30	1.30	1.30	
23	1.44	1.40	1.46	1.42	1.39	1.30	1.30	1.30	
24	1.45	1.39	1.48	1.50	1.39	1.25	1.30	1.25	
25	1.42	1.39	1.50	1.45	1.39	1.25	1.30	1.25	
26	1.38	1.39	1.50	1.45	1.38	1.25	1.30	1.25	
27	1.36	1.40	1.50	1.45	1.35	1.25	1.30	1.25	
28	1.39	1.42	1.50	1.44	1.35	1.25	1.30	1.25	
29	1.40	1.43	1.50	1.48	1.35	1.25		1.25	
30	1.42	1.40	1.50	1.47	1.35	1.25		1.25	
31	1.42		1.45		1.35	1.25		1.25	

Daily discharge, in second-feet, of Marsh Creek near Marysville, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.3	2.4	2.0	2.4	3.0	2.2	1.6	2.0	1.6
2	1.3	2.4	2.0	2.4	2.9	2.9	1.6	2.1	1.8
3	1.3	2.2	2.0	2.4	2.7	2.3	2.9	1.8	1.8
4	1.3	2.2	2.4	2.6	2.5	2.8	2.1	1.8	1.8
5	1.4	2.0	2.4	2.5	2.5	2.4	2.1	1.8	1.8
6	1.4	2.0	2.4	2.6	2.4	2.9	2.1	1.8	1.8
7	1.4	2.0	2.4	3.2	2.4	2.4	2.0	1.8	
8	1.4	2.0	2.4	3.2	2.4	2.4	2.0	1.7	
9	1.5	2.0	2.3	2.7	2.3	2.4	1.8	1.7	
10	1.5	2.0	2.3	2.5	2.4	2.2	1.6	1.6	
11	1.5	1.9	2.3	2.4	2.4	2.1	1.6	2.1	
12	1.5	2.1	2.3	2.7	2.4	2.0	1.6	2.1	
13	1.6	2.0	2.1	2.7	2.4	2.0	1.6	2.1	
14	1.6	1.8	2.1	2.7	2.4	1.9	1.6	2.1	
15	1.6	1.9	4.4	2.7	2.6	1.9	1.6	2.1	
16	1.7	2.0	2.7	2.4	2.4	1.9	1.6	2.1	
17	1.7	1.9	2.5	2.4	2.6	1.6	1.6	2.1	
18	1.8	2.0	2.5	2.0	2.8	1.6	1.6	2.1	
19	2.0	2.0	2.6	8.4	2.6	1.6	1.6	2.1	
20	2.4	2.0	2.5	4.2	2.4	1.7	1.6	1.8	
21	2.4	2.1	2.5	2.9	2.4	1.8	1.8	1.8	
22	2.4	2.0	2.4	2.6	2.4	1.8	1.8	1.8	
23	2.4	2.0	2.5	2.6	2.3	1.8	1.8	1.8	
24	2.4	2.0	2.7	3.4	2.3	1.6	1.8	1.6	
25	2.2	2.0	2.9	2.9	2.3	1.6	1.8	1.6	
26	1.9	2.0	2.9	2.9	2.3	1.6	1.8	1.6	
27	1.8	2.0	2.9	2.9	2.1	1.6	1.8	1.6	
28	2.0	2.2	2.9	2.8	2.1	1.6	1.8	1.6	
29	2.0	2.3	2.9	3.2	2.1	1.6	1.9	1.6	
30	2.2	2.0	2.9	3.1	2.1	1.6	2.0	1.6	
31	2.2		2.4		2.1	1.6		1.6	

NOTE.—Daily discharge determined from two poorly defined rating curves, as follows: Mar. 18 to June 18 and June 19 to Nov. 6. Discharge estimated Mar. 1 to 17 and Sept. 29 to Oct. 1.

Monthly discharge of Marsh Creek near Marysville, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 1.30	80	
February			[a] 1.30	72	
March	2.4	1.3	1.78	109	C.
April	2.4	1.8	2.05	122	C.
May	4.4	2.0	2.53	156	C.
June	8.4	2.0	2.95	176	C.
July	3.0	2.1	2.42	149	C.
August	2.9	1.6	1.98	122	C.
September	2.9	1.6	1.80	107	C.
October	2.1	1.6	1.84	113	C.
November			[a] 1.70	101	
December			[a] 1.50	92	
The year			1.93	1,400	

[a] Estimated.

DEARBORN RIVER BASIN.

DEARBORN RIVER NEAR CLEMONS, MONT.

Location.—2 miles above Clemons, Mont., half a mile above the headworks of the old Dearborn Canal, and half a mile above the mouth of Falls Creek.

Records available.—May 4, 1908, to December 31, 1911.

Drainage area.—110 square miles.

Gage.—Staff; not read every day as it is about 2 miles from observer's house. The datum of the gage was lowered 1 foot on October 21, 1910, and all gage heights for the year were consequently changed.

Channel.—Permanent.

Discharge measurements.—Made from cable just above gage or by wading.

Winter flow.—Stream freezes over and gage-height observations are discontinued.

Diversions.—None above the station.

Accuracy.—Interpolations between gage readings are believed to be fairly accurate.

Discharge measurements of Dearborn River near Clemons, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 17[a]	J. C. Beebe		13.7	June 25	B. E. Jones	1.65	252
Mar. 21	do	0.93	38	July 28	R. Richards	1.09	78
May 21	B. E. Jones	1.68	252	Oct. 27	W. A. Lamb	.93	43
June 6	J. C. Beebe	2.08	508				

[a] Ice conditions. Discharge estimated from a measurement made below mouth of Falls Creek, wading.

Daily gage height, in feet, of Dearborn River near Clemons, Mont., for 1911.

[O. A. Kench, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1					1.49		0.94	1.04
2		1.10	1.42	1.97	1.44	1.09		
3						1.08	.97	1.14
4		1.00	1.50	2.15		1.13		
5					1.39		1.35	1.08
6		.97	1.61	2.05	1.37	1.11		
7			1.75				1.38	1.07
8		.97		2.65	1.34	1.10		1.06
9		.96	1.69	2.15	1.30	1.10	1.39	
10				2.10			1.38	1.06
11			1.60	2.10	1.30	1.09		1.06
12		1.04					1.37	
13			1.65	2.15	1.27	1.05	1.37	1.05
14		1.00			1.22			
15			2.35	2.00		1.03	1.28	1.05
16		.99			1.20		1.20	
17			2.05	1.88		1.00		
18		1.05			1.19		1.20	1.07
19		1.11	2.00	1.80		1.00		
20					1.16	.99	1.20	1.03
21	0.93	1.16	1.68	1.76	1.19			
22						.99	1.18	1.00
23	.90	1.30	1.64	1.75	1.16			
24				1.72		.97	1.17	1.00
25	.93	1.30	1.66	1.65	1.15			.99
26					1.12	.97	1.15	
27	.99	1.35	1.60	1.59		.99		1.05
28					1.09	.98	1.11	
29	.94	1.37	1.52	1.52				.94
30		1.34			1.09		1.05	
31	.98		1.82			.95		.94

Daily discharge, in second-feet, of Dearborn River near Clemons, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	30	62	140	376	176	71	44	61
2	30	73	152	424	159	71	46	71
3	31	63	166	502	153	69	48	81
4	31	53	180	580	147	79	90	75
5	32	50	202	534	142	77	132	69
6	32	48	224	488	137	75	136	68
7	33	48	290	824	133	74	140	67
8	33	48	276	1,160	129	73	141	65
9	34	47	260	580	118	73	142	65
10	34	51	240	530	118	72	140	65
11	35	56	220	530	118	71	138	65
12	35	61	231	555	114	67	137	64
13	36	57	242	580	111	63	137	63
14	36	53	521	512	99	61	125	63
15	37	52	800	445	96	59	113	63
16	38	52	644	404	94	56	94	64
17	39	57	488	363	93	53	94	66
18	40	63	466	339	92	53	94	67
19	41	75	445	315	89	53	94	68
20	42	80	350	305	86	52	94	59
21	42	86	256	295	92	52	92	56
22	40	102	247	292	89	52	90	53
23	38	118	238	290	86	50	88	53
24	40	118	242	275	85	48	87	53
25	42	118	247	242	84	48	86	52
26	47	125	234	230	77	48	84	58
27	52	132	220	216	74	52	80	63
28	48	134	204	202	71	50	75	54
29	44	137	188	188	71	49	69	44
30	47	129	258	182	71	47	63	44
31	50	....	327	....	71	46	....	44

NOTE.—Daily discharge determined from a fairly well-defined rating curve. Discharge Mar. 1 to 20 estimated. Discharge interpolated for days on which gage was not read.

Monthly discharge of Dearborn River near Clemons, Mont., for 1911.

[Drainage area 110 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	....	....	[a] 35	0.318	0.37	2,150	D.
February	....	....	[a] 30	.273	.28	1,670	D.
March	52	30	38.4	.349	.40	2,360	C.
April	137	48	78.3	.712	.79	4,660	B.
May	800	140	297	2.70	3.11	18,300	B.
June	1,160	182	425	3.86	4.31	25,300	B.
July	176	71	106	.964	1.11	6,520	B.
August	79	46	60.1	.546	.63	3,700	B.
September	142	44	99.8	.907	1.01	5,940	B.
October	81	44	61.4	.558	.64	3,780	B.
November	....	....	[a] 40	.364	.41	2,380	D.
December	....	....	[a] 35	.318	.37	2,150	D.
The year	1.160	....	109	.991	13.43	78,900	

[a] Estimated.

FALLS CREEK NEAR CLEMONS, MONT.

Location.—At a point 1½ miles above Clemons, Mont., 500 feet above the mouth of the creek.

Records available.—May 4, 1908, to December 31, 1911; fragmentary because of the great distance the observer lives from the gage.

Drainage area.—Not measured.

Gage.—Staff; datum unchanged.

Channel.—Permanent except in flood.

Discharge measurements.—Made by wading or from a cable.

Winter flow.—Affected by ice.

Diversions.—The entire flow of this stream reaches Dearborn River.

Accuracy.—Interpolations between observed gage heights believed to be fairly accurate.

Falls Creek affords opportunities for water power development above the station, as its fall is large.

Discharge measurements of Falls Creek near Clemons, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 17	J. C. Beebe	(a)	[b] 11.3	June 25	B. E. Jones	1.50	101
Mar. 21	do	0.70	11.8	July 28	R. Richards	1.01	41
May 21	B. E. Jones	1.57	111	Oct. 27	W. A. Lamb	[a] 1.05	32
June 6	J. C. Beebe	2.04	226				

[a] Ice conditions.

[b] Discharge estimated from measurement made below junction with Dearborn River.

Daily gage height in feet of Falls Creek near Clemons, Mont., for 1911.

[O. A. Kench, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1					1.41		0.91	1.03
2		0.77	1.11	1.83	1.37	1.0		
3						1.0	.92	1.14
4		.77	1.15	2.12		1.04		
5					1.32		1.1	1.1
6		.77	1.29	1.96	1.29	1.04		
7			1.45				1.27	1.08
8		.78		2.25	1.23	1.05		1.08
9		.78	1.42	2.02	1.22	1.04	1.3	
10				2.02			1.32	1.08
11			1.39	2.0	1.21	1.02		1.08
12		.98					1.38	
13			1.41	2.18	1.19	.97	1.4	1.1
14		.97			1.17			
15			1.86	1.97		.97	1.32	1.07
16		.99			1.12		1.28	
17			1.8	1.75		.95		
18		.82			1.11		1.19	1.11
19		.83	1.77	1.68		.94		
20					1.09	.94	1.14	1.1
21	0.70	.87	1.57	1.65	1.17			
22						.93	1.15	1.1
23	.70	.93	1.50	1.63	1.12			
24				1.58		.93	1.15	1.1
25	.70	1.05	1.49	1.51	1.09			1.08
26					1.08	.92	1.11	
27	.72	1.10	1.49	1.49		.92		.93
28					1.01	.91	1.09	
29	.72	1.10	1.48	1.45				.93
30		1.11	1.7		1.00		1.05	.91
31	.74		1.7			.92		

Daily discharge, in second-feet, of Falls Creek near Clemons, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	15	42	156	85	40	31	43
2	....	16	42	172	78	40	32	49
3	....	16	44	209	75	40	32	55
4	....	16	47	246	72	44	41	52
5	....	16	56	225	70	44	50	50
6	....	16	66	205	66	44	61	49
7	....	16	92	245	62	44	72	48
8	....	16	90	285	57	45	74	48
9	....	16	87	220	56	44	76	48
10	....	20	84	220	59	43	79	48
11	....	24	81	215	63	42	85	48
12	....	29	83	240	62	40	90	49
13	....	29	85	264	61	37	93	50
14	....	29	132	236	58	37	86	48
15	....	30	180	208	55	37	79	47
16	....	30	172	180	52	36	73	48
17	....	24	165	152	52	35	67	50
18	....	18	162	144	51	34	61	51
19	....	19	158	136	50	34	58	51
20	....	20	136	133	49	34	55	51
21	12	21	114	130	58	34	56	51
22	12	23	107	128	55	33	56	51
23	12	25	101	126	52	33	56	51
24	12	30	100	116	50	33	56	51
25	12	36	99	103	49	32	54	48
26	12	38	99	101	48	32	51	40
27	13	41	99	99	44	32	50	33
28	13	41	98	96	41	31	49	33
29	13	41	97	92	40	31	47	33
30	14	42	140	88	40	32	45	31
31	14	....	140	....	40	32	....	31

NOTE.—Daily discharge determined from two fairly well-defined curves as follows: Mar. 21 to July 9 and July 11 to Oct. 31.

Monthly discharge of Falls Creek near Clemons, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a] 10	615	
February	....	....	[a] 10	555	
March	14	....	10.9	670	C.
April	42	15	25.1	1,490	B.
May	180	42	103	6,330	B.
June	285	88	172	10,200	B.
July	85	40	56.5	3,470	C.
August	45	31	37.1	2,280	C.
September	93	31	60.5	3,600	C.
October	55	31	46.3	2,850	C.
November	....	....	[a] 25	1,490	
December	....	....	[a] 15	922	
The year	285	....	47.7	34,500	

[a] Estimated. Discharge Mar. 1 to 20 estimated at 10 second-feet per day.

SUN RIVER BASIN.

NORTH FORK OF SUN RIVER NEAR AUGUSTA, MONT.

Location.—At the head of Kilraven ditch, near Christian's ranch, 12 miles northwest of Augusta, 21 miles southwest of Chouteau, Mont.

Records available.—October 31, 1903, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain, datum unchanged.

Channel.—Permanent.

Discharge measurements.—Made from cable.

Winter flow.—Affected by ice.

Diversions.—Water is diverted below the station for irrigation of the valley lands, but no water is diverted above the station.

Accuracy.—Conditions for accurate determination of discharge are excellent, except during the winter months.

Discharge measurements of North Fork of Sun River near Augusta, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 14	J. C. Beebe	[a]1.83	242	June 8	J. C. Beebe	4.43	4,900
Mar. 23	do	1.04	447	24	B. E. Jones	3.35	2,670
May 19	B. E. Jones	3.43	2,870	July 27	R. Richards	1.41	652
19	do	3.39	2,780	Oct. 25	W. A. Lamb	0.94	351

[a] Ice present.

Daily gage height, in feet of North Fork of Sun River near Augusta, Mont., for 1911.

[Charles Dox, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	1.4	......	......	2.2	4.0	3.1	1.4	......	0.9	0.9	0.9
2	0.8	......	......	1.0	......	4.5	3.1	......	0.9	1.1	0.95	0.9
3	......	1.5	......	......	2.3	4.5	3.1	1.4	0.9	1.2	0.9	0.85
4	0.8	1.5	......	1.0	......	......	3.1	......	......	1.1	0.85	0.8
5	......	......	......	......	3.9	......	3.0	1.4	1.2	1.0	0.85	0.8
6	0.8	1.3	1.2	......	......	4.0	3.0	1.5	......	1.1	0.85	0.8
7	......	......	......	1.0	3.5	......	2.9	......	1.4	1.0	0.85	0.8
8	1.4	1.3	1.3	......	......	4.4	2.8	1.4	......	0.9	0.85	0.85
9	......	......	......	0.9	3.2	......	2.6	......	1.0	1.0	0.85	0.8
10	1.6	1.3	......	......	......	3.9	2.5	1.5	1.0	0.9	0.85	0.8
11	......	......	1.1	......	3.0	......	2.2	......	......	0.9	0.9	0.85
12	1.6	1.1	......	0.9	......	......	2.0	1.5	1.1	1.0	1.0	0.85
13	1.8	......	1.1	......	......	4.5	......	1.5	......	0.9	1.05	0.85
14	......	......	......	......	......	......	1.9	......	1.0	0.9	1.25	0.85
15	1.6	1.1	1.0	1.1	......	4.8	1.9	1.4	......	1.0	1.35	0.8
16	......	......	......	......	4.2	......	1.8	......	1.0	1.0	1.4	0.75
17	......	1.1	0.8	1.0	3.6	3.9	......	1.1	1.0	1.0	1.45	0.7
18	1.3	......	......	......	3.5	......	1.7	......	......	1.1	1.35	0.75
19	......	1.0	0.8	1.2	......	......	......	1.0	1.0	1.2	1.1	0.75
20	1.3	......	......	......	3.0	3.8	1.7	......	......	1.1	1.0	0.7
21	......	......	0.9	1.9	......	......	......	1.0	0.9	1.0	0.95	0.75
22	1.2	......	......	......	3.0	3.8	1.4	......	0.9	1.1	0.85	0.8
23	......	......	1.2	2.1	......	......	......	1.0	......	1.0	0.8	0.8
24	1.4	......	......	2.0	3.0	3.7	1.5	......	1.0	1.0	0.85	0.85
25	......	......	1.0	2.2	......	......	1.6	0.9	......	1.0	0.85	0.8
26	1.4	......	......	......	2.8	3.6	......	......	1.0	0.85	0.9	0.85
27	......	......	0.9	2.4	......	3.5	......	.09	......	0.8	0.9	0.85
28	1.4	......	......	......	2.7	3.4	1.4	......	1.0	0.85	0.9	0.8
29	......	......	1.0	2.2	......	3.3	......	0.9	......	0.85	0.8	0.75
30	1.5	......	......	......	2.8	3.1	1.3	1.0	0.9	0.8	0.9	0.75
31	......	......	0.9	......	2.8	......	......	0.9	......	0.9	......	0.75

NOTE.—Gage heights Jan. 7 to Feb. 11 and Nov. 14 to Dec. 31 distorted by ice.

Daily discharge, in second-feet, of North Fork of Sun River near Augusta, Mont., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	250	510	395	1,350	3,920	2,320	630	340	340	340.
2	270	520	420	1.400	5.000	2,320	630	340	435	362
3	290	530	420	1,450	5,000	2,320	630	340	495	340
4	310	540	420	2,580	4.640	2.320	630	418	435	320
5	330	540	420	3,710	4,280	2.190	630	495	385	320
6	350	540	420	3.320	3,920	2,190	710	562	435	320
7	370	570	420	2,970	4,350	2,060	670	630	385	320
8	390	600	395	2,740	4,780	1,940	630	508	340	320
9	410	560	370	2,520	4,240	1,710	670	385	385	320
10	440	520	370	2.380	3,710	1.600	710	385	340	320
11	460	480	370	2,250	4,140	1,300	710	410	340	340
12	480	480	370	2,670	4,570	1,120	710	435	385	385
13	480	480	405	3.000	5,000	1,080	710	410	340	410
14	480	450	440	3,500	5,340	1,030	670	385	340	400
15	480	420	480	3.920	5,690	1,030	630	385	385	390
16	480	375	450	4,340	4,700	950	532	385	385	380
17	480	330	420	3,140	3,710	910	435	385	385	370
18	450	330	480	2,970	3.610	870	410	385	435	360
19	420	330	540	2,610	3,520	870	385	385	495	350
20	420	350	805	2,250	3,430	870	385	362	435	340
21	430	370	1,070	2,250	3,430	750	385	340	385	320
22	440	455	1,160	2,250	3,430	630	385	340	435	300
23	450	540	1,250	2,250	3,340	670	385	362	385	300
24	460	480	1,160	2,250	3,250	710	362	385	385	300
25	470	420	1,350	2,120	3,160	790	340	385	385	290
26	480	395	1,450	2,000	3,080	740	340	385	320	290
27	490	370	1,550	1,940	2,920	680	340	385	300	290
28	500	395	1,450	1,880	2,760	630	340	385	320	280
29	....	420	1,350	1,940	2,610	595	340	362	320	280
30	....	395	1,350	2.000	2,320	560	385	340	300	280
31	....	370	....	2,000	....	595	340	....	340	....

NOTE.—Daily discharge determined from two rating curves that are well defined and are used for periods from Feb. 12 to June 17, and from June 18 to Nov. 12, respectively. Discharge estimated Feb. 1 to 11, Nov. 14 to 30, and on days for which gage heights are missing.

Monthly discharge of North Fork of Sun River near Augusta, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a] 250	15,400	C.
February	500	250	420	23,300	B.
March	600	330	454	27,900	B.
April	1,550	370	732	43,600	B.
May	4,340	1,350	2,520	155,000	B.
June	5,690	2,320	3,930	234,000	B.
July	2,320	560	1,240	76,200	B.
August	710	340	518	31,900	B.
September	630	340	400	23,800	B.
October	495	300	380	23,400	B.
November	410	280	331	19,700	C.
December	....	....	[a] 275	16,900	D.
The year	....	....	954	691,000	

[a] Estimated.

SUN RIVER AT SUN RIVER, MONT.

Location.—At the highway bridge at Sun River, Mont. The principal tributaries of Sun River all enter above the station; South Fork of Sun River, Willow Creek, and Simms Creek are the most important.

Records available.—July 31, 1905, to December 31, 1911.

Drainage area.—Not measured.

Gage.—A staff nailed to piling on the left bank just above the bridge; datum unchanged.

Channel.—Shifts at all stages.

Discharge measurements.—Made from bridge or by wading.

Diversions.—Practically the entire valley above this point is irrigated with water taken from the river.

Accuracy.—Conditions at the measuring section have been very poor since the high water of 1907; at low stages good measurements can be made.

Discharge measurements of Sun River at Sun River, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 25	C. S. Heidel	2.95	702	Aug. 9	R. Richards	3.19	595
May 16	B. E. Jones	7.75	5,860	15	J. C. Beebe	2.86	412
June 26	.....do	5.48	2,660	Dec. 11	B. E. Jones	2.63	437

Daily gage height, in feet, of Sun River at Sun River, Mont., for 1911.

[R. A. Lange, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2.8	4.1	5.4	5.4	2.6	2.6	2.9	2.7
2	....	2.9	4.2	5.9	5.0	2.7	2.6	3.0	2.8
3	....	2.9	4.5	7.6	4.8	2.8	2.6	3.3	2.8
4	....	2.9	4.6	7.4	4.8	2.7	3.2	3.6	2.8
5	....	2.9	4.8	7.2	4.6	3.3	3.2	3.3	2.7
6	....	2.8	5.0	6.6	4.2	3.4	3.2	3.2	2.7
7	....	2.8	7.0	7.2	4.2	3.3	3.1	3.0	2.6
8	....	2.7	6.4	7.2	4.0	3.2	3.0	3.0	2.6
9	....	2.7	5.6	7.1	3.8	3.2	3.0	3.0	2.3
10	....	2.8	5.6	7.0	3.6	3.2	3.0	3.0	2.2
11	....	2.8	5.2	7.8	3.5	3.2	3.0	2.8	2.2
12	....	2.7	5.0	7.6	3.5	3.0	3.0	3.0	2.3
13	....	2.7	5.0	7.5	3.6	2.8	3.0	3.0	2.6
14	....	2.7	4.8	7.4	3.6	2.8	3.0	3.0	3.3
15	....	2.7	5.0	7.2	3.4	2.8	3.0	3.0	3.4
16	....	2.8	7.0	7.2	3.4	2.8	3.0	3.0	3.3
17	....	2.8	7.0	7.0	3.3	2.7	3.0	3.0	....
18	....	3.0	6.6	7.0	3.4	2.7	3.0	3.0	....
19	....	3.0	5.8	6.8	3.3	2.6	2.9	3.0	....
20	....	3.0	5.6	6.6	3.2	2.6	2.9	3.0	....
21	....	3.2	5.5	6.9	3.2	2.6	3.0	3.0	....
22	....	3.8	5.4	6.8	3.3	2.5	3.0	3.0	....
23	....	4.1	5.4	6.6	3.1	2.4	2.9	3.0	....
24	....	4.0	5.4	6.4	3.0	2.4	2.9	2.9	....
25	....	4.6	5.2	6.2	3.0	2.5	3.0	2.9	....
26	3.0	4.6	5.2	6.0	3.0	2.5	3.0	2.9	....
27	2.8	5.0	5.0	5.8	3.0	2.6	2.9	2.8	....
28	2.8	5.0	5.0	5.5	2.8	2.6	2.9	2.8	....
29	2.7	4.6	4.9	5.4	2.8	2.6	3.0	2.8	....
30	2.8	4.2	4.6	5.4	2.8	2.6	3.0	2.8	....
31	2.8	....	4.8	....	2.6	2.6	....	2.8	....

Daily discharge, in second-feet, of Sun River at Sun River, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.	....	630	1,500	2,510	2,510	310	350	440	430
2.	....	680	1,580	3,120	2,080	350	350	480	470
3.	....	680	1,830	5,620	1,880	390	350	700	470
4.	....	680	1,920	5,300	1,880	350	650	900	470
5.	....	680	2,110	4,980	1,680	650	650	700	430
6.	....	630	2,310	4,080	1,320	710	650	650	430
7.	....	630	4,780	4,980	1,320	650	540	480	390
8.	....	580	3,960	4,980	1,150	590	480	480	390
9.	....	580	2,960	4,830	990	590	480	480	275
10.	....	630	2,960	4,680	850	590	480	480	240
11.	....	630	2,510	5,940	780	590	480	440	240
12.	....	580	2,310	5,620	780	490	480	480	275
13.	....	580	2,310	5,460	850	390	480	480	390
14.	....	580	2,110	5,300	850	390	480	490	740
15.	....	580	2,310	4,980	710	390	480	480	800
16.	....	630	4,780	4,980	710	390	480	570	740
17.	....	630	4,680	4,680	650	350	480	570	....
18.	....	730	4,080	4,680	710	350	480	570	....
19.	....	730	2,990	4,380	650	310	440	570	....
20.	....	730	2,750	4,080	590	310	440	570	....
21.	....	850	2,630	4,530	590	310	490	570	....
22.	....	1,260	2,510	4,380	650	280	480	570	....
23.	....	1,500	2,510	4,080	540	250	440	570	....
24.	....	1,420	2,510	3,800	490	250	440	520	....
25.	....	1,920	2,290	3,520	490	280	480	520	....
26.	730	1,920	2,290	3,250	490	280	480	520	....
27.	630	2,310	2,080	2,990	490	310	440	470	....
28.	630	2,310	2,080	2,630	390	310	440	470	....
29.	580	1,920	1,980	2,510	390	310	480	470	....
30.	630	1,580	1,680	2,510	390	310	480	470	....
31.	630	....	1,880	....	310	310	....	470	....

NOTE.—Daily discharge determined as follows: Mar. 25 to May 16 and May 17 to Aug. 31 from two fairly well-defined curves; Sept. 1 to Nov. 16, by indirect method for shifting channels.

Monthly discharge of Sun River at Sun River, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a]350	21,500	D.
February	....	....	[a]500	27,800	D.
March	730	....	572	35,200	C.
April	2,310	580	993	59,100	B.
May	4,780	1,500	2,620	161,000	B.
June	5,940	2,510	4,310	256,000	B.
July	2,510	310	908	55,800	B.
August	710	250	398	24,500	B.
September	650	350	478	28,400	C.
October	900	440	538	33,100	C.
November	800	240	473	28,100	C.
December	....	....	[a]400	24,600	D.
The year	5,940	....	1,040	755,000	

[a] Estimated.

NOTE.—Discharge Mar. 1 to 24 and Nov. 17 to 30 estimated at 550 second-feet and 500 second-feet per day, respectively.

WILLOW CREEK NEAR AUGUSTA, MONT.

Location.—At Jordan's ranch, just below the mouth of Little Willow Creek and about 7 miles northwest of Augusta.

Records available.—June 8, 1905, to May 14, 1911.

Drainage area.—Not measured.

Gage.—A standard chain on right bank near observer's footbridge; datum unchanged.

Channel.—Permanent.

Winter flow.—No ice forms at this station as a large spring enters the creek just above the gage.

Diversions.—Water is diverted from the creek above the station for irrigation of the valley lands.

Storage.—Willow Creek dam, work on which has been begun, will provide a reservoir with a capacity of 84,320 acre-feet.

Accuracy.—Conditions for obtaining accurate discharge data are excellent.

Discharge measurements of Willow Creek near Augusta, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 14	John C. Beebe	0.65	3.5
Mar. 23	....do	.96	9.5
May 19	B. E. Jones	1.58	36
June 9	J. C. Beebe	2.56	83
July 27	R. Richards	.95	13

Daily gage height, in feet, and discharge, in second-feet, of Willow Creek near Augusta, Mont., for 1911.

[Elizabeth Ireland, observer.]

Day.	January.		February.		March.		April.		May.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	0.66	4.0	0.66	4.0	0.60	3.0	0.91	9.1	0.90	8.8
2	.62	3.3	.67	4.1	.60	3.0	.90	8.8	.90	8.8
3	.60	3.0	.67	4.1	.61	3.2	.92	9.3	.84	7.4
4	.61	3.2	.67	4.1	.62	3.3	.92	9.3	.84	7.4
5	.61	3.2	.67	4.1	.63	3.5	.90	8.8	.93	9.6
6	.63	3.5	.67	4.1	.65	3.8	1.00	11	1.03	12
7	.64	3.6	.67	4.1	.65	3.8	.93	9.6	.97	11
8	.64	3.6	.67	4.1	.65	3.8	.91	9.1	.98	11
9	.65	3.8	.67	4.1	.68	4.3	.91	9.1	.90	8.8
10	.64	3.6	.68	4.3	.71	4.8	.91	9.1	.90	8.8
11	.64	3.6	.68	4.3	.71	4.8	.90	8.8	.90	8.8
12	.63	3.5	.68	4.3	.74	5.4	.85	7.7	.85	7.7
13	.64	3.6	.68	4.3	.77	6.0	.89	8.6	.80	6.5
14	.64	3.6	.68	4.3	.80	6.5	.85	7.7	.80	6.5
15	.64	3.6	.67	4.1	.95	10.0	.80	6.5	....	....
16	.64	3.6	.65	3.8	.95	10	.80	6.5	....	....
17	.65	3.8	.65	3.8	.98	11	.80	6.5	....	....
18	.65	3.8	.65	3.8	.98	11	.80	6.5	....	....
19	.68	4.3	.65	3.8	1.01	12	.83	7.2	....	....
20	.70	4.6	.64	3.6	1.15	16	.80	6.5	....	....
21	.70	4.6	.63	3.5	1.05	13	.80	6.5	....	....
22	.69	4.4	.62	3.3	1.03	12	.80	6.5	....	....
23	.68	4.3	.60	3.0	1.06	13	.90	8.8	....	....
24	.67	4.1	.60	3.0	1.09	14	.89	8.6	....	....
25	.67	4.1	.60	3.0	1.03	12	.85	7.7	....	....
26	.66	4.0	.60	3.0	.95	10	.85	7.7	....	....
27	.65	3.8	.60	3.0	.95	10	.85	7.7	....	....
28	.65	3.8	.60	3.0	.96	10	.90	8.8	....	....
29	.65	3.8	....	....	.96	10	.90	8.8	....	....
30	.66	4.0	....	....	.94	9.8	.90	8.8	....	....
31	.66	4.0	....	....	.94	9.8	....	....	....	....

NOTE.—Daily discharge determined from a rating curve well defined at all gage heights.

Monthly discharge of Willow Creek River near Augusta, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	4.6	3.0	3.80	234	A.
February	4.3	3.0	3.79	210	A.
March	16.0	3.0	8.15	501	A.
April	11.0	6.5	8.19	487	A.
May 1-14	12.0	6.5	8.79	244	A.

SOUTH FORK OF SUN RIVER AT AUGUSTA, MONT.

Location.—In sec. 11, T. 20 N., R. 6 W., at the highway bridge on the road from Augusta to Craig, Mont., about half a mile from Augusta.

Records available.—December 2, 1904, to December 31, 1911.

Drainage area.—Not measured.

Gage.—The original gage was spiked to the cribwork of the right abutment on the downstream side of the bridge; a new gage was installed April 17, 1907, at a different datum and was used during 1907 and 1908; records for 1909, 1910, and 1911 are referred to the old gage.

Channel.—Shifting.

Discharge measurements.—High-stage measurements may be made from the highway bridge; low-stage measurements are made by wading.

Winter flow.—Affected by ice.

Diversions.—Water is diverted to irrigate the valley lands both above and below stations. During dry seasons the entire summer flow is utilized.

Discharge measurements of South Fork of Sun River at Augusta, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 15	John C. Beebe	([a])	19.7	June 25	B. E. Jones	1.85	189
Mar. 2	.....do	0.98	38	26	.....do	1.82	163
May 20	B. E. Jones	1.95	279	July 26	R. Richards	1.28	32
June 9	J. C. Beebe	2.44	459	Oct. 26	W. A. Lamb	1.42	44

[a] About 10 inches of ice over the entire river.

Daily gage height, in feet, of South Fork of Sun River at Augusta, Mont., for 1911.

[W. J. Auchard, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	0.9	1.0	2.3	1.8	1.3	1.2	1.5	1.4
2	....	.9	.9	2.6	1.8	1.3	1.2	1.4	1.7
3	....	.9	.9	2.7	1.8	1.3	1.2	1.6	1.5
4	....	.9	.9	2.5	1.7	1.3	1.4	1.5	1.4
5	....	.9	.9	2.3	1.7	1.4	1.4	1.5	1.4
6	....	.9	.9	2.3	1.7	1.4	1.5	1.5	1.4
7	....	.8	.9	2.2	1.6	1.4	1.5	1.5	1.4
8	....	.8	.9	2.5	1.6	1.4	1.5	1.5	1.4
9	....	.9	.9	2.4	1.6	1.4	1.5	1.5	1.7
10	....	.9	.9	2.3	1.6	1.4	1.5	1.5	2.2
11	....	.9	.9	2.2	1.5	1.3	1.5	1.5	2.3
12	....	.8	.9	2.2	1.5	1.3	1.5	1.5	2.7
13	....	.8	.9	2.2	1.5	1.3	1.5	1.5	2.7
14	....	.8	.9	2.1	1.5	1.3	1.5	1.5	2.7
15	....	.8	1.1	2.0	1.5	1.3	1.5	1.5	2.7

Daily gage height, in feet, of South Fork of Sun River at Augusta, Mont., for 1911—Con.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16	....	0.8	2.5	2.0	1.4	1.3	1.5	1.5	2.7
17	....	.8	2.3	2.0	1.4	1.3	1.5	1.5	2.1
18	....	.8	2.1	1.9	1.4	1.2	1.5	1.5	2.1
19	....	.8	2.0	1.9	1.4	1.2	1.5	1.5	1.9
20	....	.8	1.9	1.9	1.4	1.3	1.5	1.5	1.6
21	....	.8	1.9	1.9	1.4	1.3	1.5	1.5	1.5
22	....	.9	1.8	1.9	1.3	1.2	1.5	1.5	1.4
23	....	1.0	1.8	1.9	1.3	1.2	1.5	1.5	1.5
24	1.6	.9	1.8	1.9	1.3	1.2	1.5	1.5	1.4
25	1.6	.9	1.8	1.9	1.3	1.2	1.5	1.5	....
26	.9	1.0	1.9	1.8	1.3	1.2	1.5	1.5	....
27	.9	1.0	1.9	1.8	1.3	1.2	1.5	1.5	....
28	.9	1.0	1.8	1.8	1.2	1.2	1.5	1.4	....
29	.9	1.0	1.8	1.8	1.2	1.2	1.5	1.4	....
30	.9	1.0	1.9	1.8	1.2	1.2	1.5	1.4	....
31	.9	....	2.0	....	1.2	1.2	....	1.4	....

NOTE.—Gage heights distorted by ice Mar. 24 to 25 and Nov. 1 to 24.

Daily discharge, in second-feet, of South Fork of Sun River at Augusta, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	38	30	45	400	160	30	20	65
2	38	30	30	520	160	30	20	45
3	38	30	30	560	160	30	20	90
4	38	30	30	480	120	30	45	65
5	37	30	30	400	120	45	45	65
6	37	30	30	400	120	45	65	65
7	37	20	30	365	90	45	65	65
8	36	20	30	480	90	45	65	65
9	36	30	30	440	90	45	65	65
10	36	30	30	390	90	45	65	65
11	35	30	30	340	65	30	65	65
12	35	20	30	340	65	30	65	65
13	35	20	30	340	65	30	65	65
14	34	20	30	290	65	30	65	65
15	34	20	60	245	65	30	65	65
16	34	20	480	245	45	30	65	65
17	33	20	400	245	45	30	65	65
18	33	20	330	200	45	20	65	65
19	33	20	295	200	45	20	65	65
20	32	20	260	200	45	30	65	65
21	32	20	260	200	45	30	65	65
22	32	30	230	200	30	20	65	65
23	31	45	230	200	30	20	65	65
24	30	30	230	200	30	20	65	65
25	30	30	230	200	30	20	65	65
26	30	45	260	160	30	20	65	65
27	30	45	260	160	30	20	65	65
28	30	45	230	160	20	20	65	45
29	30	45	230	160	20	20	65	45
30	30	45	260	160	20	20	65	45
31	30	....	295	....	20	20	....	45

NOTE.—Daily discharges determined from two fairly well-defined rating curves for periods Mar. 26 to June 9 and June 10 to Oct. 31. Discharges estimated Mar. 1 to 23.

Monthly discharge of South Fork of Sun River at Augusta, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 20	1,230	
February			[a] 25	1,390	
March	38	30	34	2,090	C.
April	45	20	29.0	1,730	B.
May	480	30	160	9,840	B.
June	560	160	296	17,600	B.
July	160	20	66.1	4,060	B.
August	45	20	29.0	1,780	B.
September	65	20	59.2	3,520	B.
October	90	45	62.6	3,850	B.
November			[a] 40	2,380	
December			[a] 25	1,540	
The year			70.5	51,000	

[a] Estimated.

FORD CREEK NEAR AUGUSTA, MONT.

Location.—At the ranch of Joseph Ford, 16 miles west of Augusta, Mont. Ford Creek unites with Smith Creek to form the South Fork of Sun River. Ford Creek has no tributary.

Records available.—April 11, 1906, to December 31, 1911.

Drainage area.—18 square miles.

Gage.—Staff, on the right bank near the observer's house; datum unchanged.

Channel.—Shifting; current swift.

Discharge measurements.—Made by wading.

Winter flow.—Little affected by ice.

Diversions.—One irrigation ditch, capacity about 15 sec.-ft., diverts water from the creek above the gage.

Accuracy.—As conditions of flow are changeable, frequent discharge measurements are necessary to properly define the rating curve.

Discharge measurements of Ford Creek near Augusta, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 15	J. C. Beebe	Ice.	10.1	June 24	B. E. Jones	1.64	53
Mar. 21	do	0.80	10.9	July 27	R. Richards	1.29	28
May 20	B. E. Jones	1.72	66.	Oct. 27	W. A. Lamb	1.10	12.8
June 9	J. C. Beebe	2.03	104				

Daily gage height, in feet, of Ford Creek near Augusta, Mont., for 1911.

[Joseph Ford, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		1.00	1.20	2.00	1.52	1.30	1.20
2		1.00	1.20	2.05	1.50	1.30	1.20
3		1.00	1.30	2.10	1.50	1.30	1.20
4		1.05	1.42	2.02	1.50	1.30	1.20
5		1.05	1.50	2.00	1.45	1.30	1.20
6		1.05	1.52	2.00	1.40	1.30	1.20
7		1.00	1.50	2.10	1.40	1.25	1.20
8		1.00	1.42	2.10	1.40	1.20	1.20
9		1.00	1.40	2.00	1.40	1.20	1.20
10		1.00	1.40	2.00	1.40	1.20	1.20

Daily gage height, in feet, of Ford Creek near Augusta, Mont., for 1911—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
11	....	1.00	1.40	2.00	1.40	1.18	1.20
12	....	1.00	1.40	1.92	1.40	1.15	1.20
13	....	1.05	1.40	1.90	1.40	1.15	1.20
14	....	1.00	1.40	1.90	1.40	1.15	1.18
15	....	1.00	2.05	1.88	1.40	1.15	1.15
16	....	....	1.98	1.80	1.40	1.15	1.15
17	....	1.00	1.85	1.80	1.40	1.20	1.15
18	....	1.00	1.78	1.80	1.40	1.20	1.15
19	....	1.00	1.70	1.80	1.40	1.20	1.15
20	....	1.00	1.70	1.75	1.40	1.20	1.15
21	....	1.00	1.70	1.70	1.38	1.20	1.15
22	....	1.00	1.70	1.60	1.35	1.20	1.15
23	1.00	1.00	1.70	1.60	1.30	1.20	1.15
24	1.00	1.00	1.70	1.60	1.30	1.20	1.15
25	1.00	1.22	1.70	1.60	1.30	1.20	1.12
26	1.00	1.25	1.65	1.60	1.30	1.20	1.10
27	1.00	1.32	1.60	1.60	1.30	1.20	1.10
28	1.00	1.30	1.60	1.55	1.30	1.20	1.10
29	1.00	1.20	1.65	1.55	1.30	1.20	1.10
30	1.00	1.20	1.75	1.55	1.30	1.20	1.10
31	1.00	....	1.85	....	1.30	1.20	....

Daily discharge, in second-feet, of Ford Creek near Augusta, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	10	13	21	100	44	26	18
2	10	13	21	107	42	26	18
3	10	13	27	114	42	26	18
4	10	15	36	103	42	26	18
5	10	15	42	100	38	26	18
6	10	15	44	100	34	26	18
7	10	13	42	114	34	23	18
8	10	13	36	114	34	21	18
9	10	13	34	100	34	21	18
10	10	13	34	100	34	21	18
11	11	13	34	100	34	20	18
12	11	13	34	89	34	17	18
13	11	15	34	86	34	17	17
14	11	13	34	86	34	17	16
15	11	13	107	84	34	17	15
16	11	13	97	74	34	17	15
17	11	13	80	74	34	19	15
18	11	13	72	74	34	19	15
19	11	13	62	74	34	19	15
20	11	13	62	68	34	19	15
21	11	13	62	62	33	19	15
22	12	13	62	52	30	19	15
23	13	13	62	52	27	19	15
24	13	13	62	52	27	19	15
25	13	22	62	52	27	19	14
26	13	24	57	52	27	19	14
27	13	28	52	52	27	19	14
28	13	27	52	47	26	18	13
29	13	21	57	47	26	18	13
30	13	21	68	47	26	18	13
31	13	....	80	....	26	18	....

NOTE.—Daily discharge Mar. 23 to July 27 determined from a rating curve fairly well defined; discharge July 28 to Sept. 30 determined by indirect method for shifting channels; discharge Mar. 1 to 22 estimated.

Monthly discharge of Ford Creek near Augusta, Mont., for 1911.

[Drainage area, 18 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a] 10	0.556	0.64	615	D.
February			[a] 10	.556	.58	555	D.
March			[a] 11.3	.628	.72	695	C.
April	28	13	15.4	.856	.96	916	B.
May	107	21	52.5	2.92	3.37	3,230	B.
June	114	47	79.2	4.40	4.91	4,710	B.
July	44	26	32.9	1.83	2.11	2,020	B.
August	26	17	20.3	1.13	1.30	1,250	C.
September	18	13	16.0	.889	.99	952	C.
October			[a] 13	.722	.83	799	C.
November			[a] 10	.556	.62	595	D.
December			[a] 8	.444	.51	492	D.
The year			23.2	1.29	17.54	16,800	

[a] Estimated.

SMITH CREEK NEAR AUGUSTA, MONT.

Location.—At a point 1 mile above J. W. Nixon's ranch, 16 miles southwest of Augusta, Mont.

Records available.—April 14, 1906, to December 31, 1911.

Drainage area.—26 square miles.

Gage.—Inclined staff fastened to a bowlder on the left bank just above the ford.

Channel.—Shifts during high stages.

Discharge measurements.—Made by wading.

Winter flow.—Open entire year.

Diversions.—The ordinary summer flow of this creek is practically all used for irrigation, but no water is diverted above the gaging station.

Discharge measurements of Smith Creek near Augusta, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 16	J. C. Beebe	0.38	9.6	June 9	J. C. Beebe	1.25	131
Mar. 21	do	.48	13.4	24	B. E. Jones	.90	52
May 20	B. E. Jones	1.09	97	July 28	R. Richards	.56	23
June 7	J. C. Beebe	1.26	135	Oct. 27	W. A. Lamb	.44	12.3
7	do	1.26	127				

Daily gage height, in feet, of Smith Creek near Augusta, Mont., for 1911.

[Mrs. J. W. Nixon, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	0.5	0.7	1.75	0.8	0.5	0.5	0.6	0.35	0.45
2	....	.5	.7	1.8	.8	.5	.5	.65	.55	.45
3	....	.5	.7	1.7	.8	.5	.5	.7	.55	.45
4	....	.5	.8	1.6	.75	.5	.55	.6	.55	.45
5	....	.5	.9	1.4	.75	.5	.65	.6	.55	.45
6	....	.5	1.0	1.3	.7	.5	.65	.6	.55	.4
7	....	.5	.95	1.25	.7	.5	.7	.6	.55	.4
8	....	.5	.9	1.35	.65	.5	.75	.6	.5	.4
9	....	.5	.9	1.25	.65	.5	.75	.6	.5	.4
10	....	.5	.9	1.2	.65	.5	.75	.6	.5	.4
11	0.3	.5	.9	1.2	.65	.5	.8	.6	.5	.4
12	.3	.5	.85	1.15	.65	.5	.8	.6	.5	.35
13	.3	.5	.9	1.15	.65	.5	.75	.6	.5	.35
14	.3	.5	.95	1.1	.65	.5	.75	.6	.5	.35
15	.3	.5	2.4	1.1	.7	.5	.7	.6	.5	.35
16	.3	.5	1.7	1.0	.7	.5	.7	.6	.5	.35
17	.3	.5	1.45	1.0	.65	.5	.65	.6	.5	.35
18	.3	.5	1.3	1.0	.65	.5	.65	.6	.5	.35
19	.4	.5	1.2	1.0	.65	.5	.6	.6	.5	.35
20	.45	.55	1.1	.9	.65	.5	.6	.6	.5	.35
21	.5	.55	1.1	.9	.65	.5	.6	.6	.5	.35
22	.5	.6	1.05	.9	.6	.5	.6	.6	.5	.35
23	.5	.65	1.0	.85	.6	.5	.6	.6	.5	.35
24	.5	.7	1.0	.9	.6	.5	.6	.6	.5	.35
25	.5	.7	1.0	.9	.55	.5	.6	.6	.5	.35
26	.5	.8	1.0	.9	.55	.5	.6	.6	.5	.35
27	.5	.75	1.0	.85	.55	.5	.6	.6	.5	.35
28	.5	.7	1.1	.85	.55	.5	.6	.6	.5	.35
29	.5	.7	1.1	.85	.5	.5	.6	.6	.5	.35
30	.5	.7	1.15	.8	.5	.5	.6	.55	.5	.35
31	.5	....	1.5	....	.5	.5	....	.55	....	.35

Daily discharge, in second-feet, of Smith Creek near Augusta, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6	15	34	252	47	15	15	23	19	12
2	6	15	34	264	47	15	15	28	19	12
3	6	15	34	239	47	15	15	34	19	12
4	6	15	47	214	40	15	19	23	19	12
5	6	15	62	164	40	15	28	23	19	12
6	6	15	80	141	34	15	28	23	19	9
7	6	15	71	130	34	15	34	23	19	9
8	6	15	62	152	28	15	40	23	15	9
9	6	15	62	130	28	15	40	23	15	9
10	6	15	62	119	28	15	40	23	15	9
11	6	15	62	119	28	15	47	23	15	9
12	6	15	54	108	28	15	47	23	15	7.5
13	6	15	62	108	28	15	40	23	15	7.5
14	6	15	71	98	28	15	40	23	15	7.5
15	6	15	414	98	34	15	34	23	15	7.5
16	6	15	239	80	34	15	34	23	15	7.5
17	6	15	176	80	28	15	28	23	15	7.5
18	6	15	141	80	28	15	28	23	15	7.5
19	9	15	119	80	28	15	23	23	15	7.5
20	12	19	98	62	28	15	23	23	15	7.5
21	15	19	98	62	28	15	23	23	15	7.5
22	15	23	89	62	23	15	23	23	15	7.5
23	15	28	80	54	23	15	23	23	15	7.5
24	15	34	80	62	23	15	23	23	15	7.5
25	15	34	80	62	19	15	23	23	15	7.5
26	15	47	80	62	19	15	23	23	15	7.5
27	15	40	80	54	19	15	23	23	15	7.5
28	15	34	98	54	19	15	23	23	15	7.5
29	15	34	98	54	15	15	23	23	15	7.5
30	15	34	108	47	15	15	23	19	15	7.5
31	15	....	189	....	15	15	....	19	....	7.5

NOTE.—Daily discharge determined from a rating curve well defined below 165 second-feet. Discharge estimated Mar. 1 to 10.

Monthly discharge of Smith Creek near Augusta, Mont., for 1911.

[Drainage area, 26 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a] 10.0	0.385	0.44	615	C.
February			[a] 8.0	.308	.32	444	D.
March	15		9.5	.365	.42	584	C.
April	47	15	21.0	.808	.90	1,250	B.
May	414	34	98.8	3.80	4.38	6,080	B.
June	264	47	110	4.23	4.72	6,550	B.
July	47	15	28.5	1.10	1.27	1,750	B.
August	15	15	15.0	.577	.67	922	B.
September	47	15	28.3	1.09	1.22	1,680	B.
October	34	19	23.3	.896	1.03	1,430	B.
November	19	15	15.9	.612	.68	946	B.
December	12	7.5	8.52	.328	.38	524	B.
The year	414		31.5	1.21	16.43	22,800	

[a] Estimated.

MARIAS RIVER BASIN.

MARIAS RIVER NEAR SHELBY, MONT.

Location.—At the highway bridge near James A. Johnson's ranch, 7 miles south of Shelby, Mont.

Records available.—April 4, 1902, to June 30, 1906; March 21 to December 31, 1911.

Drainage area.—2,610 square miles.

Gages.—A standard chain gage fastened to the up-stream guardrail of the bridge was read during 1905–6; a Bristol automatic and a staff gage were set when the station was reestablished in 1911. The new gages are at practically the same datum as the old gage.

Channel.—Straight for 100 yards above and 200 yards below the station; right bank sandy, sloping, and liable to overflow; left bank high and protected by sheet piling and a plank wall. Bed composed of sand and gravel with some cobblestones. Liable to shift after freshets. Only one channel at all stages. Current is of moderate velocity and sets toward the left bank as it rounds a sharp curve some distance above.

Discharge measurements.—Made from highway bridge, lower chord of which is about 15 feet above low water.

Winter flow.—Affected by ice.

Discharge measurements of Marias River near Shelby, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 21	C. S. Heidel	[a] 5.91	1,170	Aug. 14	J. C. Beebe	3.59	810
May 13	do	5.0	2,260	Oct. 3	C. S. Heidel	4.42	1,770
June 28[b]	do	5.08	2,430	18	B. E. Jones	3.96	1,120

[a] Ice present.

[b] New chain gage placed same datum as staff but different section.

Daily gage height, in feet, of Marias River near Shelby, Mont., for 1911.

[Orin Hughes, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	4.6	5.5	5.0	3.5	3.1	4.3	3.65	4.1
2	....	4.6	6.05	4.8	3.7	3.1	4.4	3.6	4.0
3	....	4.8	6.55	4.7	3.8	3.0	4.4	3.6	4.05
4	....	5.0	6.7	4.6	3.8	3.8	4.4	3.6	4.05
5	....	5.4	6.5	4.5	3.7	4.7	4.3	3.55	3.95
6	....	5.8	6.2	4.4	3.6	6.5	4.2	3.55	3.95
7	....	5.75	5.95	4.3	3.7	6.1	4.1	3.4	3.9
8	....	5.6	5.95	4.2	3.7	5.4	4.1	3.3	3.95
9	....	5.6	5.9	4.2	3.9	5.1	4.1	2.9	3.95
10	....	5.5	5.7	4.1	3.8	....	4.0	2.7	....
11	....	5.3	5.7	4.0	3.9	5.0	3.9	2.9	....
12	....	5.2	5.75	3.9	3.8	5.1	3.8	3.3	3.8
13	....	5.1	5.95	3.8	3.7	....	3.7	3.5	3.8
14	....	5.2	5.95	3.8	3.6	5.0	3.7	3.8	3.85
15	....	5.4	5.95	3.7	3.6	4.7	3.8	3.8	3.7
16	....	6.95	5.9	3.8	3.5	4.5	4.0	3.85	3.7
17	....	7.75	5.7	3.8	3.5	4.6	3.9	3.9	3.7
18	....	7.25	5.45	3.7	3.4	4.5	3.95	4.1	3.75
19	....	6.65	5.35	3.7	3.4	4.4	3.9	4.2	3.8
20	....	6.15	5.25	3.7	3.3	4.3	3.9	4.3	3.9
21	....	5.7	5.2	3.7	3.3	4.2	3.85	....	3.85
22	....	5.7	5.35	3.7	3.2	4.3	3.85	....	3.8
23	4.4	5.6	5.55	....	3.3	....	3.8	4.4	3.9
24	4.35	5.55	6.1	3.6	3.4	....	3.8	4.5	3.85
25	4.7	5.55	6.7	3.6	3.3	....	3.75	4.5	3.8
26	5.0	5.45	6.35	3.5	3.3	....	3.7	4.4	3.7
27	5.2	5.3	5.65	3.5	3.4	4.4	3.6	4.35	3.7
28	5.05	5.2	5.1	3.4	3.4	4.5	3.6	4.2	....
29	5.05	5.15	....	3.4	3.3	4.4	3.7	4.2	....
30	4.7	5.15	....	3.4	3.2	4.4	3.7	4.1	....
31	....	5.25	....	3.4	3.2	....	3.65	....	....

NOTE.—Gage heights Nov. 12 to 30 distorted by ice.

Daily discharge, in second-feet, of Marias River near Shelby, Mont., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1,830	2,960	2,310	750	480	1,500	870
2	....	1,830	3,730	2,070	910	480	1,610	830
3	....	2,070	4,430	1,950	1,000	430	1,610	830
4	....	2,310	4,640	1,830	1,000	1,000	1,610	830
5	....	2,830	4,360	1,720	910	1,950	1,500	790
6	....	3,380	3,940	1,610	830	4,360	1,390	790
7	....	3,310	3,590	1,500	910	3,800	1,290	680
8	....	3,100	3,590	1,390	910	2,830	1,290	610
9	....	3,100	3,520	1,390	1,090	2,440	1,290	390
10	....	2,960	3,240	1,290	1,000	2,380	1,190	300
11	....	2,700	3,240	1,190	1,090	2,310	1,090	380
12	....	2,570	3,310	1,090	1,000	2,440	1,000	370
13	....	2,440	3,590	1,000	910	2,380	910	360
14	....	2,570	3,590	1,000	830	2,310	910	350
15	....	2,830	3,590	910	830	1,950	1,000	340
16	....	4,990	3,520	1,000	750	1,720	1,190	330
17	....	6,110	3,240	1,000	750	1,830	1,090	320
18	....	5,410	2,900	910	680	1,720	1,140	310
19	....	4,570	2,760	910	680	1,610	1,090	300
20	....	3,870	2,640	910	610	1,500	1,090	290
21	....	3,240	2,570	910	610	1,390	1,040	280
22	....	3,240	2,760	910	540	1,500	1,040	270
23	1,610	3,100	3,030	870	610	1,520	1,000	260
24	1,560	3,030	3,800	830	680	1,540	1,000	250
25	1,950	3,030	4,640	830	610	1,570	955	250
26	2,310	2,900	4,150	750	610	1,590	910	250
27	2,570	2,700	3,170	750	680	1,610	830	250
28	2,380	2,570	2,440	680	680	1,720	830	250
29	2,380	2,500	2,440	680	610	1,610	910	250
30	1,950	2,500	2,310	680	540	1,610	910	250
31	....	2,640	....	680	540	....	870	....

NOTE.—Daily discharge determined from a rating curve well defined between 750 and 2,960 second-feet. Discharge estimated Nov. 12 to 30 and for days for which gage heights are missing.

Monthly discharge of Marias River near Shelby, Mont., for 1911.

[Drainage area, 2,610 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April 23-30	2,570	1,560	2,090	0.801	0.24	33,200	A.
May	6,110	1,830	3,100	1.19	1.37	191,000	B.
June	4,640	2,310	3,390	1.30	1.45	202,000	B.
July	2,310	680	1,150	.441	.51	70,700	A.
August	1,090	540	779	.298	.34	47,900	A.
September	4,360	430	1,850	.709	.79	110,000	A.
October	1,610	830	1,130	.433	.50	69,500	A.
November	870	250	427	.164	.18	25,400	C.
December			[a] 250	.096	.11	15,400	D.
The period						765,000	

[a] Estimated.

TWO MEDICINE RIVER AT FAMILY, MONT.

Location.—In the NE. ¼ NE. ¼ sec. 2, T. 31 N., R. 9 W., at the Holy Family Mission, 16 miles southeast of Browning, Mont., and about 6 miles above the mouth of Badger Creek, the nearest tributary.

Records available.—April, 1907, to December 31, 1911.

Drainage area.—368 square miles.

Gage.—Standard chain on the east bank of the stream directly back of the Mission buildings; datum of gage was lowered 0.95 foot July 21, 1908.

Channel.—Gravel.

Discharge measurements.—Low-water measurements made by wading at section near the gage; high-water measurements must be made from the old wagon bridge about 3 miles above the Mission.

Winter flow.—Affected by ice.

Diversions and storage.—Water is diverted at a point about 2 miles above the gage by a ditch which supplies water for about 100 acres of land on the farm at the Holy Family Mission. The United States Reclamation Service has under construction a project which will use about 200 second-feet of water for irrigating land north of the stream for the Blackfeet Indians. The water will be diverted near the mouth of Little Badger Creek, a small tributary entering from the south above the station. A storage reservoir will be built at Two Medicine Lake near the headwaters of the stream to augment the low-water flow.

Accuracy.—Results at this station are good except during the winter months.

Discharge measurements of Two Medicine River at Family, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 1[a]	B. E. Jones	4.32	53	June 12	B. E. Jones	3.95	1,400
Mar. 16	do	1.56	72	July 14	W. A. Lamb	2.25	324
May 11	do	3.63	1,170				

[a] Ice at gage.

Daily gage height, in feet, of Two Medicine River at Family, Mont., for 1911.

[Walter Owens, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2.3	3.2	3.8	2.95	1.9	1.7	2.5	1.8
2	....	2.2	3.4	4.3	2.85	1.85	1.65	2.5	1.8
3	....	2.1	3.6	4.5	2.8	1.9	1.6	2.55	1.8
4	....	2.0	3.8	4.5	2.75	1.85	3.4	2.5	1.8
5	....	1.9	4.3	4.2	2.7	1.85	3.6	2.4	1.75
6	....	1.9	4.6	4.0	2.75	1.9	3.3	2.35	1.7
7	....	1.95	3.9	4.0	2.65	1.95	3.15	2.3	1.75
8	2.5	2.0	4.0	3.9	2.6	1.95	3.0	2.25	1.8
9	1.5	2.05	4.2	3.7	2.6	2.0	3.05	2.2	1.75
10	1.4	2.25	3.6	3.7	2.5	2.1	3.1	2.15	1.75
11	1.9	2.2	3.45	3.8	2.4	2.0	3.2	2.15	1.8
12	2.3	2.1	3.5	4.0	2.35	1.95	3.15	2.2	....
13	1.45	2.1	3.6	3.9	2.3	1.95	3.1	2.35	....
14	1.5	2.0	3.7	4.0	2.25	1.95	3.0	2.25	....
15	1.5	2.0	3.6	3.9	2.25	1.9	2.9	2.2	....
16	1.6	2.2	6.8	3.8	2.2	1.85	2.95	2.2	....
17	1.6	2.55	5.2	3.8	2.25	1.85	2.8	2.2	....
18	1.6	2.75	4.6	3.5	2.25	1.8	2.65	2.15	....
19	1.7	2.7	4.3	3.5	2.2	1.8	2.55	2.1	....
20	1.8	3.1	4.0	3.45	2.15	1.85	2.45	2.0	....
21	2.0	3.6	3.7	3.35	2.15	1.8	2.45	1.95	....
22	2.2	3.8	3.8	3.4	2.1	1.8	2.6	1.95	....
23	2.35	3.6	3.6	3.35	2.05	1.75	2.6	2.0	....
24	2.6	3.4	3.5	3.45	1.9	1.75	2.65	2.05	....
25	2.6	3.9	3.3	3.8	2.0	1.8	2.7	2.0	....
26	2.25	4.2	3.3	3.3	1.95	1.8	2.75	1.95	....
27	2.2	4.2	3.2	3.25	1.95	1.8	2.8	1.9	....
28	2.0	3.5	3.3	3.2	1.8	1.75	2.65	1.85	....
29	2.05	3.3	3.2	3.05	1.9	1.7	2.55	1.85	....
30	2.25	3.15	3.3	3.05	1.85	1.6	2.5	1.9	....
31	2.3	....	3.35	....	1.95	1.7	....	1.85	....

NOTE.—Gage heights distorted by ice Mar. 8 to 12.

Daily discharge, in second-feet, of Two Medicine River at Family, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	50	325	855	1,320	988	167	107	425	135
2	50	280	1,000	1,770	625	151	96	425	135
3	51	240	1,150	1,950	595	167	84	452	135
4	51	202	1,320	1,950	565	151	1,000	425	135
5	52	167	1,770	1,680	535	151	1,150	375	121
6	52	167	2,040	1,490	565	167	925	350	107
7	53	184	1,400	1,490	508	184	820	325	121
8	54	202	1,490	1,400	480	184	720	302	135
9	55	221	1,680	1,230	480	202	752	280	121
10	56	302	1,150	1,230	425	240	785	260	121
11	57	280	1,040	1,320	375	202	855	260	135
12	58	240	1,080	1,490	350	184	820	280	....
13	58	240	1,150	1,400	325	184	785	350	....
14	65	202	1,230	1,490	302	184	720	302	....
15	65	202	1,150	1,400	302	167	655	280	....
16	84	280	4,140	1,320	280	151	688	280	....
17	84	452	2,620	1,320	302	151	595	280	....
18	84	565	2,040	1,080	302	135	508	260	....
19	107	535	1,770	1,080	280	135	452	240	....
20	135	785	1,490	1,040	260	151	400	202	....
21	202	1,150	1,230	962	260	135	400	184	....
22	280	1,320	1,320	1,000	240	135	480	184	....
23	350	1,150	1,150	962	221	121	480	202	....
24	480	1,000	1,080	1,040	167	121	508	221	....
25	480	1,400	925	1,320	202	135	535	202	....
26	302	1,680	925	925	184	135	565	184	....
27	280	1,680	855	890	184	135	595	167	....
28	202	1,080	925	855	135	121	508	151	....
29	221	925	855	752	167	107	452	151	....
30	302	820	925	752	151	84	425	167	....
31	325	....	962	....	184	107	....	151	....

NOTE.—Daily discharge determined from a well-defined rating curve. Discharges Mar. 1 to 12 estimated.

Monthly discharge of Two Medicine River at Family, Mont., for 1911.

[Drainage area, 368 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			50	0.136	0.16	3,070	C.
February			50	.136	.14	2,780	C.
March	480		153	.416	.48	9,410	B.
April	1,680	167	609	1.65	1.84	36,200	A.
May	4,140	855	1,380	3.75	4.32	84,800	B.
June	1,950	752	1,260	3.42	3.82	75,000	A.
July	988	135	353	.959	1.11	21,700	A.
August	240	84	153	.416	.48	9,410	A.
September	1,150	84	596	1.62	1.81	35,500	A.
October	452	151	268	.728	.84	16,500	A.
November			120	.326	.36	7,140	C.
December			90	.244	.28	5,530	D.
The year	4,140		424	1.15	15.64	307,000	

NOTE.—Means for January, February, and December, estimated; mean for period Nov. 12–30 estimated at 115 second-feet.

BADGER CREEK NEAR FAMILY, MONT.

Location.—In the NE. ¼ sec. 19, T. 31 N., R. 8 W., near the road crossing, 4 miles east of Family, Mont.

Records available.—April 20, 1907, to December 31, 1911.

Drainage area.—224 square miles.

Gage.—Chain. The original staff gage established April 20, 1907, and bench marks were washed out in June, 1908, and a new gage was established July 22, 1908, about 400 feet farther upstream and at a different datum; as the bench mark was also destroyed the relation between the two gages could not be determined. The gage was again washed out on May 25, 1909, and was reset at a different datum and 400 feet below the old Piegan Mission crossing.

Channel.—Two channels at both medium and low stages; at high stages the stream flows in several channels.

Discharge measurements.—High-water measurements made from a cable 4 miles above the gage; low-water measurements can be made by wading at the ford above the gage.

Diversions.—The United States Reclamation Service proposes to divert the natural flow of Badger Creek to irrigate land in the eastern part of the Blackfeet Indian Reservation north of Birch Creek.

Accuracy.—High-water measurements are only fair; low-water records are, however, good.

Discharge measurements of Badger Creek near Family, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 1[a]	B. E. Jones	3.8	30	June 27	W. A. Lamb	4.79	557
Mar. 16[a]	....do	5.52	73	July 14	....do	4.24	269
May 11	....do	4.80	576	Aug. 30	B. E. Jones	3.86	146
June 11	....do	5.07	809	Oct. 16	....do	4.47	368

[a] Ice measurement.

Daily gage height, in feet, of Badger Creek near Family, Mont., for 1911.

[Oliver J. Racine, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		3.85	4.55	5.2		4.1	3.9	4.7	4.2
2		3.85	4.7	5.35	4.7	4.1	3.95	4.7	4.2
3		3.85	4.75	5.4		4.1	4.0	4.7	4.2
4		3.85	4.85	5.3		4.15	4.3	4.6	4.2
5		3.85	4.85	5.15	4.55		4.95	4.6	4.2
6		3.8	4.95	5.1	4.5	4.1	4.85	4.6	4.2
7		3.75	5.0	5.15	4.5	4.1	4.85	4.6	4.25
8		3.75	5.0	5.1	4.45	4.1	4.85	4.5	4.3
9		3.75	5.0	5.1	4.4	4.1	4.85	4.45	4.3
10		3.8	4.85	5.1	4.35	4.1	4.85	4.4	4.4
11		3.9	4.8	5.15	4.4	4.1	4.9	4.45	4.4
12		3.9	4.8	5.1	4.4	4.1	4.85	4.5	
13		3.85	4.85	5.15	4.35	4.1	4.9	4.6	
14		3.85	4.9	5.2	4.3	4.1	4.85	4.6	
15		3.85	5.1	5.05	4.3	4.05	4.8	4.5	
16		3.9	5.35	5.0	4.25	4.05	4.75	4.5	
17		3.95	5.25	4.95	4.25	4.0	4.7	4.25	
18		4.0	5.15	4.9	4.25	3.95	4.65	4.3	
19	3.9	4.15	5.0	4.85	4.2	3.9	4.6	4.4	
20	3.9	4.25	4.95	4.85	4.2	3.95	4.65	4.4	
21	4.0	4.5	4.95	4.8	4.2	3.9	4.7	4.4	
22	4.0	4.55	5.0	4.8	4.2	3.9	4.7	4.4	
23	3.95	4.7	5.0	4.85	4.15	3.9	4.7	4.35	
24	3.95	4.7	4.95	5.0	4.15	3.9	4.7	4.3	
25	3.9	4.75	4.85	4.95	4.1	3.9	4.65	4.3	
26	3.85	4.9	4.8	4.9	4.1	3.9	4.65	4.2	
27	3.85	4.85	4.75	4.85	4.05	3.9	4.65	4.2	
28	3.9	4.75	4.7	4.8	4.05	3.9	4.65	4.2	
29	3.9	4.65	4.65	4.75	4.05	3.9	4.65	4.2	
30	3.85	4.55	4.75	4.8	4.05	3.9	4.7	4.2	
31	3.85		4.95		4.1	3.9		4.2	

NOTE.—Gage heights distorted by ice Mar. 19 to 31 and Nov. 7 to 11.

Daily discharge, in second-feet, of Badger Creek near Family, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	25	150	412	905	532	215	160	500
2	28	150	500	1,060	500	215	172	500
3	31	150	532	1,120	470	215	185	500
4	34	150	600	1,010	440	232	290	440
5	37	150	600	855	412	224	675	440
6	40	140	675	805	385	215	600	440
7	43	132	715	855	385	215	600	440
8	46	132	715	805	360	215	600	385
9	49	132	715	805	335	215	600	360
10	52	140	600	805	312	215	600	335
11	55	160	565	855	335	215	635	360
12	58	160	565	805	335	215	600	385
13	61	150	600	855	312	215	635	440
14	65	150	635	905	290	215	600	440
15	69	150	805	760	290	200	565	385
16	73	160	1,060	715	270	200	532	385
17	78	172	958	675	270	185	500	270
18	83	185	855	635	270	172	470	290
19	88	232	715	600	250	160	440	335
20	93	270	675	600	250	172	470	335
21	98	385	675	565	250	160	500	335
22	103	412	715	565	250	160	500	335
23	108	500	715	600	232	160	500	312
24	113	500	675	715	232	160	500	290
25	118	532	600	675	215	160	470	290
26	123	635	565	635	215	160	470	250
27	128	600	532	600	200	160	470	250
28	133	532	500	565	200	160	470	250
29	138	470	470	532	200	160	470	250
30	142	412	532	565	200	160	500	250
31	146		675		215	160		250

NOTE.—Daily discharge determined from a rating curve well defined between 140 and 900 second-feet. Discharges estimated Mar. 1 to 31.

Monthly discharge of Badger Creek near Family, Mont., for 1911.

[Drainage area, 224 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a] 30	0.134	0.15	1,840	D.
February			[a] 25	.112	.12	1,390	D.
March	146	25	[a] 79.0	.353	.41	4,860	C.
April	635	132	273	1.22	1.36	16,200	B.
May	1,060	412	650	2.90	3.34	40,000	B.
June	1,120	532	748	3.34	3.72	44,500	B.
July	532	200	304	1.36	1.57	18,700	B.
August	232	160	190	.848	.98	11,700	B.
September	675	160	493	2.20	2.46	29,300	B.
October	500	250	356	1.59	1.83	21,900	B.
November			[a] 175	.781	.87	10,400	D.
December			[a] 75	.335	.39	4,610	D.
The year	1,120		284	1.27	17.22	205,000	

[a] Estimated.

CUTBANK CREEK AT CUTBANK, MONT.

Location.—In the SW. ¼ SW. ¼ sec. 1, T. 33 N., R. 6 W., half a mile west of Cutbank, at the Great Northern Railway bridge, and 12 miles above the mouth of Two Medicine River.

Records available.—August 4, 1905, to December 31, 1911.

Drainage area.—971 square miles.

Gage.—Chain on left bank; moved upstream 200 yards August 31, 1911. New datum.

Channel.—Gravel; shifts in flood.

Discharge measurements.—At high stages made from a cable 100 yards below the gage; low-stage measurements made by wading.

Winter flow.—Affected by ice.

Diversions.—The intake of the Great Northern Railway's pumping station is located 100 feet below the gage; the average quantity pumped is about 14,000 gallons an hour for 18 hours a day, equivalent to a continuous flow of 0.4 second-foot.

Accuracy.—Results as a whole are good.

Discharge measurements of Cutbank Creek at Cutbank, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 6	B. E. Jones	([a])	15.6	Aug 3	John C. Beebe	3.52	208
Mar. 18	do	3.33	56	Aug. 31[b]	B. E. Jones	4.15	59
May 12	do	3.65	337	Sept. 24	W. A. Lamb	4.78	279
12	do	3.65	342	Oct. 17	B. E. Jones	4.41	122
June 13	do	4.00	709	Dec. 10	do	[a] 4.75	64

[a] Ice.

[b] New gage established; new datum.

Daily gage height, in feet, of Cutbank Creek at Cutbank, Mont., for 1911.

[Chas. Ferres, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	3.56	3.51	3.76	3.94	3.30	4.15	4.58	4.40
2	....	3.46	3.54	3.96	3.82	3.27	4.12	4.55	4.50
3	....	3.36	3.54	4.15	3.74	3.42	4.12	4.60	4.62
4	....	3.21	3.56	4.20	3.66	3.37	4.38	4.58	4.52
5	....	3.21	3.56	4.15	3.64	3.34	5.25	4.52	4.48
6	....	3.31	3.66	3.98	3.64	3.34	5.55	4.50	4.50
7	....	3.26	3.86	3.88	3.59	3.47	5.55	4.50	4.30
8	....	3.36	3.81	3.94	3.59	3.44	5.20	4.50	....
9	....	3.31	3.71	3.96	3.56	3.47	4.95	4.45	....
10	....	3.51	3.76	3.86	3.52	3.47	4.82	4.45	....
11	....	3.56	3.66	3.86	3.46	3.47	4.80	4.45	....
12	....	3.46	3.66	3.96	3.44	3.47	4.78	4.42	....
13	....	3.36	3.66	4.00	3.44	3.4	4.80	4.40	....
14	....	3.26	3.71	3.97	3.44	3.32	4.80	4.40	....
15	....	3.16	3.86	3.95	3.36	3.32	4.80	4.40	....
16	....	3.16	4.45	3.95	3.38	3.30	4.78	4.40	....
17	3.36	3.24	4.70	3.85	3.43	3.23	4.72	4.40	....
18	3.31	3.36	4.35	3.83	3.48	3.21	4.70	4.40	....
19	3.41	3.38	4.10	3.80	3.51	3.19	4.62	4.40	....
20	3.51	3.31	3.94	3.75	3.41	3.16	4.60	4.40	....
21	3.54	3.36	3.86	3.75	3.35	3.11	4.60	4.38	....
22	3.68	3.54	3.81	3.85	3.33	3.11	4.60	4.35	....
23	3.76	3.61	3.86	3.85	3.33	3.13	4.70	4.35	....
24	3.56	3.61	3.81	4.15	3.33	3.11	4.75	4.42	....
25	....	3.56	3.76	5.35	3.31	3.11	4.80	4.48	....
26	....	3.64	3.76	4.30	3.28	3.13	4.75	4.40	....
27	4.05	3.66	3.76	4.00	3.23	3.16	4.75	4.50	....
28	4.15	3.68	3.74	4.30	3.23	3.16	4.70	4.52	....
29	3.66	3.66	3.68	3.95	3.23	3.11	4.68	4.40	....
30	3.71	3.56	3.66	3.86	3.23	3.09	4.60	4.38	....
31	3.71	....	3.64	....	3.25	3.03	....	4.30	....

NOTE.—Gage heights distorted by ice Nov. 1 to 7.

Daily discharge in second-feet of Cutbank Creek at Cutbank, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	290	260	423	630	120	58	182
2	....	230	276	655	488	110	52	171
3	....	182	276	910	402	170	52	190
4	....	120	290	980	326	148	112	182
5	....	120	290	910	309	136	621	160
6	....	158	356	680	309	136	949	152
7	....	138	530	557	268	195	949	152
8	....	182	480	630	268	180	572	152
9	....	158	394	655	249	195	379	135
10	....	260	436	534	223	195	298	135
11	....	290	356	534	190	195	286	135
12	....	230	356	655	180	195	276	125
13	....	182	326	705	180	160	286	118
14	....	138	370	668	180	128	286	118
15	....	102	534	642	144	128	286	118
16	....	102	1,330	642	152	120	276	118
17	182	130	1,700	522	175	98	244	118
18	158	182	1,190	500	200	91	234	118
19	206	194	840	465	216	86	199	118
20	260	158	630	412	165	78	190	118
21	276	182	534	412	140	66	190	112
22	374	276	476	522	132	66	190	104
23	436	322	534	522	132	70	234	104
24	290	322	476	910	132	66	260	125
25	440	290	423	2,680	124	66	286	145
26	590	342	423	1,120	114	70	260	118
27	736	356	423	705	98	78	260	152
28	860	374	402	1,120	98	78	234	160
29	356	356	343	642	98	66	225	118
30	394	290	326	534	98	61	190	112
31	394	....	309	....	104	50	....	90

NOTE.—Daily discharge determined as follows: Indirect method for shifting channel used to May 12; May 13 to Aug. 31, from a fairly well-defined curve; Sept. 1 to Nov. 7 (new location), from a poorly defined curve.

Monthly discharge of Cutbank Creek at Cutbank, Mont., for 1911.

[Drainage area, 971 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			16.0	0.016	0.02	984	D.
February			16.0	.016	.02	889	D.
March	860		231	.238	.27	14,200	C.
April	374	102	222	.228	.25	13,200	C.
May	1,700	260	513	.528	.61	31,500	C.
June	2,680	412	728	.750	.84	43,300	C.
July	630	98	210	.216	.25	12,900	B.
August	195	50	116	.119	.14	7,130	B.
September	949	52	298	.307	.34	17,700	C.
October	190	90	134	.138	.16	8,240	C.
November			75	.077	.09	4,460	D.
December			50	.052	.06	3,070	D.
The year	2,680		218	.224	3.05	158,000	

NOTE.—Means for January, February, November and December estimated; mean for period Mar. 1 to 16 estimated at 75 second-feet.

BIRCH CREEK NEAR DUPUYER, MONT.

Location.—In sec. 28, T. 29 N., R. 8 W., at Shield's ranch, 12 miles northwest of Dupuyer, Mont., and about 25 miles above the junction of Birch Creek with Two Medicine River.

Records available.—July 25, 1907, to December 31, 1911.

Drainage area.—155 square miles.

Gage.—A temporary staff gage was put in July 23, 1908, about 200 feet below the site of the original gage, which had been washed out by the high water of June, 1908. The temporary gage was used until October 1, 1908, when a permanent chain gage was installed at a point about one-fourth mile farther upstream.

Channel.—Shifts at high stages.

Discharge measurements.—Made from a car and cable three-fourths mile below the gage. At low stages measurements are made by wading just below the cable section.

Winter flow.—Affected by ice.

Diversions.—A number of ditches divert water for irrigation. The largest of these, owned by the Conrad Investment Co., diverts water about half a mile below the station.

Discharge measurements of Birch Creek near Dupuyer, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 23	C. S. Heidel	(a)	36	Aug. 5	R. Richards	4.70	148
Mar. 18	do	(a)	52	Oct. 6	Heidel and Templeton	5.02	228
May 12	do	5.33	299	Oct. 10	C. S. Heidel	4.96	201
June 27	do	5.57	425	Dec. 1	R. M. Templeton	4.68	142

[a] Ice measurement. Not made at regular section.

Daily gage height, in feet, of Birch Creek near Dupuyer, Mont., for 1911.

[L. G. Kepple, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.39	4.95	5.90	5.40	4.65	4.45	5.10	4.70	4.70
2	4.39	4.95	6.35	5.25	4.80	4.45	5.10	4.70	....
3	4.32	5.05	6.25	5.25	4.70	4.45	5.05	4.65	4.55
4	4.32	5.25	6.15	5.10	4.80	4.45	5.05	4.65	4.50
5	4.32	5.60	5.85	5.05	4.70	4.50	5.10	4.70	4.60
6	4.32	5.85	5.70	5.05	4.70	4.75	5.10	4.65	4.55
7	4.32	5.60	5.75	5.10	4.70	5.50	5.00	4.65	4.55
8	4.39	5.55	5.85	5.70	4.70	5.55	5.00	4.60	4.55
9	4.39	5.50	5.85	5.55	4.75	5.65	5.00	4.50	4.50
10	4.39	5.50	5.85	5.20	4.70	5.70	5.00	4.45	4.60
11	4.39	5.40	5.75	4.95	4.70	5.85	5.00	4.35	4.55
12	4.32	5.35	5.75	4.80	4.65	5.90	5.10	4.30	4.55
13	4.32	5.35	5.60	4.80	4.60	5.85	5.10	4.30	4.55
14	4.39	5.25	5.75	4.80	4.60	5.65	5.00	5.05	4.55
15	4.39	5.85	5.70	4.80	4.60	5.55	4.95	5.05	4.60
16	4.39	6.4	5.70	4.80	4.60	5.45	4.95	5.00	4.60
17	4.39	6.2	5.70	4.75	4.60	5.40	4.95	5.10	4.60
18	4.55	6.1	5.55	4.95	4.60	5.35	4.95	5.15	4.30
19	4.60	5.90	5.25	4.90	4.60	5.25	4.90	5.20	4.30
20	4.70	5.75	5.10	4.85	4.60	5.30	4.90	4.70	4.65
21	5.05	5.70	....	4.80	4.55	5.25	4.85	4.65	4.60
22	5.20	5.60	....	4.80	4.60	5.20	4.85	4.60	4.60
23	5.10	5.60	....	4.90	4.55	5.20	4.90	4.60	4.65
24	5.05	5.55	....	4.85	4.55	5.20	4.95	4.60	4.65
25	5.10	5.55	....	4.75	4.55	5.20	4.80	4.60	4.25
26	5.35	5.50	5.55	4.75	4.55	5.15	4.95	4.60	5.00
27	5.50	5.35	5.55	4.70	4.55	5.20	4.70	4.60	5.00
28	5.40	5.25	5.55	4.70	4.50	5.15	4.70	4.60	5.00
29	5.10	5.35	5.50	4.70	4.50	5.15	4.70	4.60	5.25
30	5.05	5.40	5.50	4.70	4.50	5.15	4.70	4.60	5.20
31	....	5.70	....	4.70	4.45	....	4.70	....	5.55

Note.—Gage heights distorted by ice Nov. 14 to 19 and Dec. 17 to 31.

Daily discharge, in second-feet, of Birch Creek near Dupuyer, Mont., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	101	202	533	338	140	109	240	148	148
2	101	202	728	286	168	109	240	148	134
3	92	227	683	286	148	109	227	140	124
4	92	286	640	240	168	109	227	140	116
5	92	413	512	227	148	116	240	148	131
6	92	512	452	227	148	158	240	140	124
7	92	413	472	240	148	375	214	140	124
8	101	394	512	452	148	394	214	131	124
9	101	375	512	394	158	432	214	116	116
10	101	375	512	270	148	452	214	109	131
11	101	338	472	202	148	512	214	96	124
12	92	320	472	168	140	533	240	89	124
13	92	320	413	168	131	512	240	89	124
14	101	286	472	168	131	432	214	98	124
15	101	512	452	168	131	394	202	106	131
16	101	750	452	168	131	356	202	115	131
17	101	661	452	158	131	338	202	123	131
18	124	618	394	202	131	320	202	132	120
19	131	533	286	190	131	286	190	140	120
20	148	472	240	179	131	303	190	148	120
21	227	452	271	168	124	286	179	140	110
22	270	413	299	168	131	270	179	131	110
23	240	413	327	190	124	270	190	131	110
24	227	394	355	179	124	270	202	131	110
25	240	394	375	158	124	270	168	131	110
26	320	375	394	158	124	255	202	131	100
27	375	320	394	148	124	270	148	131	100
28	338	286	394	148	116	255	148	131	100
29	240	320	375	148	116	255	148	131	100
30	227	338	375	148	116	255	148	131	100
31	....	452	....	148	109	....	148	....	100

Note.—Daily discharge determined from a rating curve fairly well defined below 500 second-feet; discharge interpolated June 21 to 25, Nov. 14 to 19, and Dec. 2; discharge estimated Dec. 17 to 31.

Monthly discharge of Birch Creek near Dupuyer, Mont., for 1911.

[Drainage area, 155 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a]50	0.323	0.37	3,070	D.
February			[a]35	.226	.24	1,940	C.
March			[a]55	.355	.41	3,380	C.
April	375	92	159	1.03	1.15	9,460	B.
May	750	202	399	2.57	2.96	24,500	B.
June	728	240	440	2.84	3.17	26,200	B.
July	452	148	209	1.35	1.56	12,900	B.
August	168	109	135	.871	1.00	8,300	B.
September	533	109	300	1.94	2.16	17,900	B.
October	240	148	201	1.30	1.50	12,400	B.
November	148	89	127	.819	.91	7,560	B.
December	148		105	.677	.78	6,460	C.
The year	750		186	1.20	16.21	134,000	

[a] Estimated.

DUPUYER CREEK AT DUPUYER, MONT.

Location.—In SW. ¼ SW. ¼ sec. 10, T. 28 N., R. 7 W., at the highway bridge in the town of Dupuyer, Mont.

Records available.—April 15, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—The original staff gage was nailed to the cribbing under the east end of the highway bridge. The gage was washed out July 28, 1909, and was replaced September 20, 1909, gage readings being reduced to the original datum. In the spring of 1909 a breakwater was constructed on the left (west) bank which deflected the water to the opposite site. A new gage was installed April 25, 1910, at the same site and the original datum, but owing to changes in the channel, the gage records for 1910 and 1911 are not directly comparable with those for earlier years.

Channel.—Shifts at high stages.

Discharge measurements.—Made from downstream side of highway bridge at high stages; low-stage measurements are made by wading.

Winter flow.—Affected by ice.

Accuracy.—Frequent measurements are necessary at this station to insure good results as conditions in the channel are unfavorable.

Discharge measurements of Dupuyer Creek at Dupuyer, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 23	C. S. Heidel	([a])	2.3
Mar. 17	do	[a]2.6	30
May 12	do	1.10	43
June 27	do	1.5	88
Aug. 5	R. Richards	1.38	62
Oct. 6	Heidel and Templeton	1.5	88
10	C. S. Heidel	1.45	75
Dec. 1	R. M. Templeton	[a]2.6	55

[a] Ice conditions.

Daily gage height, in feet, of Dupuyer Creek at Dupuyer, Mont., for 1911.

[John Pfeiffer, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.0	1.0	1.4	....	1.3	1.2	1.5	1.3	2.6
2	1.0	1.0	1.5	1.5	1.6	1.2	1.5	1.3	2.6
3	.95	1.1	1.6	1.5	1.5	1.2	1.5	1.3	2.6
4	1.0	1.1	1.6	1.4	1.4	1.75	1.5	1.3	2.6
5	1.05	1.1	1.5	1.4	1.5	2.0	1.5	1.3	2.6
6	1.0	1.1	1.5	1.4	1.5	2.0	1.5	1.3	2.2
7	1.0	1.1	1.5	1.5	1.5	2.0	1.5	1.4	1.6
8	1.05	1.1	1.4	1.4	1.5	2.0	1.5	1.4	1.6
9	1.0	1.1	1.8	1.4	1.5	2.0	1.5	1.4	1.6
10	1.0	1.1	1.8	1.4	1.4	1.9	1.5	1.5	1.6
11	.9	1.1	1.7	1.4	1.4	1.9	1.5	1.5	1.7
12	.9	1.1	1.8	1.3	1.4	1.9	1.4	1.5	1.8
13	1.0	1.1	1.7	1.3	1.4	1.9	1.4	1.5	1.8
14	1.0	1.1	1.6	1.3	1.4	1.9	1.4	1.6	1.9
15	1.0	1.3	1.6	1.3	1.3	1.8	1.4	1.7	1.9
16	1.0	1.3	1.5	1.3	1.3	1.7	1.4	1.7	1.9
17	1.0	1.4	1.5	1.3	1.2	1.7	1.4	1.7	1.9
18	1.0	1.5	1.6	1.4	1.2	1.6	1.4	1.7	1.9
19	1.0	1.6	1.5	1.4	1.2	1.6	1.4	1.7	2.0
20	1.05	1.6	1.5	1.3	1.2	1.6	1.4	1.8	2.0
21	1.1	1.5	1.5	1.3	1.2	1.6	1.4	1.9	1.9
22	1.1	1.5	1.4	1.3	1.2	1.6	1.4	2.0	1.9
23	1.0	1.6	1.5	1.3	1.2	1.6	1.4	2.0	1.9
24	1.0	1.6	1.6	1.3	1.2	1.6	1.3	2.0	1.9
25	1.1	1.6	1.6	1.3	1.2	1.6	1.3	2.0	1.9
26	1.1	1.6	1.6	1.3	1.2	1.6	1.3	2.3	1.8
27	1.1	1.5	1.6	1.2	1.2	1.6	1.2	2.3	1.8
28	1.1	1.4	1.6	1.2	1.2	1.6	1.2	2.4	1.8
29	1.1	1.4	1.6	1.2	1.2	1.5	1.3	2.5	1.8
30	1.1	1.5	1.6	1.2	1.2	1.5	1.3	2.6	1.8
31	....	1.4	....	1.2	1.2	....	1.3	....	1.8

NOTE.—Gage heights, Nov. 7 to Dec. 31, distorted by ice.

Daily discharge, in second-feet, of Dupuyer Creek at Dupuyer, Mont., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	33	33	83	97	54	42	86	54
2	33	33	105	86	108	42	86	54
3	28	43	130	86	86	42	86	54
4	33	43	128	68	68	150	86	54
5	38	43	102	68	86	234	86	54
6	33	43	101	68	86	234	86	54
7	33	43	101	86	86	234	86	....
8	38	42	79	68	86	234	86	....
9	33	42	186	68	86	234	86	....
10	33	42	185	68	68	199	86	....
11	24	42	152	68	68	199	86	....
12	24	42	183	54	68	199	68	....
13	33	42	150	54	68	199	68	....
14	33	42	121	54	68	199	68	....
15	33	68	120	54	54	166	68	....
16	33	68	96	54	54	135	68	....
17	33	87	95	54	42	135	68	....
18	33	110	118	68	42	108	68	....
19	33	136	93	68	42	108	68	....
20	38	136	92	54	42	108	68	....
21	43	110	92	54	42	108	68	....
22	43	110	72	54	42	108	68	....
23	33	135	90	54	42	108	68	....
24	33	135	112	54	42	108	54	....
25	43	134	111	54	42	108	54	....
26	43	134	110	54	42	108	54	....
27	43	107	108	42	42	108	42	....
28	43	84	108	42	42	108	42	....
29	43	83	108	42	42	86	54	....
30	43	106	108	42	42	86	54	....
31	....	83	....	42	42	....	54	....

NOTE.—Daily discharge determined as follows: Apr. 1 to May 5, from rating curve fairly well defined; June 27 to Nov. 11, from curve fairly well defined between 5 and 100 second-feet. Indirect method for shifting channels used May 6 to June 26.

Monthly discharge of Dupuyer Creek at Dupuyer, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 10	615	D.
February			[a] 5	278	D.
March			[a] 20	1,230	D.
April	43	24	35.4	2,110	C.
May	136	33	77.5	4,770	C.
June	186	72	115	6,840	C.
July	97	42	60.6	3,730	B.
August	108	42	58.9	3,620	B.
September	234	42	141	8,390	B.
October	86	42	70	4,300	B.
November			[a] 40	2,380	D.
December			[a] 20	1,230	D.
The year			54.4	39,500	

[a] Estimated.

DRY FORK OF MARIAS RIVER NEAR VALIER, MONT.

Location.—In the SW. ¼ sec. 36, T. 29 N., R. 5 W., about 9 miles southeast of Valier and 5 miles south of the dam of the Lake Francis Reservoir.

Records available.—March 19, 1911, to December 31, 1911.

Drainage area.—About 120 square miles.

Gages.—Bristol automatic and an inclined staff gage on the left bank. The Bristol gage has a range of 8 feet.

Channel.—Shifting; bed of stream composed of sand and gravel.

Discharge measurements.—At low and medium stages made by wading; during high stages it may be necessary to use floats.

Winter flow.—Affected by ice.

Diversions.—Appropriations amounting to nearly 1,200 second-feet have been filed on Dry Fork and its branches.

Discharge measurements of Dry Fork of Marias River near Valier, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 16	C. S. Heidel	[a] 2.60	32	Sept. 7	R. M. Templeton	3.30	[b] 228
19	do	[a] 3.80	153	Oct. 5	C. S. Heidel	2.60	58
May 11	do	1.47	0.99	9	do	2.20	17.9
June 27	do	1.74	9.8	9	do	2.20	18.7
Aug. 5	R. Richards	1.74	10.3	Nov. 24	R. M. Templeton	[a] 2.50	28.0

[a] Ice present.

[b] Float measurement.

Daily gage height, in feet, of Dry Fork of Marias River near Valier, Mont., for 1911.

[W. R. Hunt, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	1.9	1.6	....	1.6	0.9	1.15	2.2	2.2	2.2
2	....	1.9	1.6	....	1.9	1.7	1.15	2.2	2.2	2.2
3	....	....	1.6	....	1.9	2.75	1.15	3.2	2.1	2.3
4	....	....	1.6	1.5	1.65	2.4	1.6	3.2	2.1	2.3
5	....	....	1.6	1.5	1.55	1.9	3.8	2.9	2.4	2.2
6	....	....	1.6	1.6	1.4	1.7	4.3	2.4	2.2	2.2
7	....	....	1.6	1.7	1.3	1.9	3.3	2.2	2.2	2.2
8	....	....	1.6	1.9	1.2	2.0	3.8	2.2	2.3	2.2
9	....	1.8	1.6	1.8	1.15	1.9	2.8	2.2	2.1	2.2
10	....	1.8	1.6	1.6	1.1	2.0	2.6	2.2	2.2	2.2
11	....	1.7	1.47	1.5	1.0	1.9	2.5	2.1	2.2	2.2
12	....	1.8	....	1.5	.9	1.8	2.4	2.1	2.2	2.2
13	....	1.8	....	1.5	.9	1.6	2.4	2.2	2.3	2.2
14	....	1.7	....	1.5	.9	1.55	2.35	2.2	2.2	2.2
15	....	1.7	4.0	1.5	.9	1.5	2.3	2.2	2.2	2.2
16	2.6	1.6	....	1.5	.9	1.45	2.25	2.2	2.2	2.2
17	....	1.6	2.6	1.5	.9	1.4	2.2	2.2	2.2	2.2
18	....	1.6	....	1.5	.9	1.35	2.2	2.1	2.2	2.2
19	3.3	1.6	....	1.4	.9	1.3	2.2	2.1	2.2	2.2
20	3.1	1.5	....	1.3	.9	1.25	2.2	2.2	2.2	2.2
21	2.6	1.5	2.0	1.0	.9	1.25	2.2	2.3	2.2	2.3
22	2.1	1.55	....	1.0	.9	1.25	2.2	2.3	2.2	2.3
23	2.0	1.55	....	1.0	.9	1.25	2.3	2.2	2.2	2.3
24	2.4	1.6	....	1.0	.9	1.2	2.4	2.1	2.2	2.2
25	2.0	1.6	....	2.0	.9	1.2	2.4	2.1	2.3	2.2
26	2.0	1.6	1.9	1.8	.9	1.2	2.35	2.1	2.2	2.2
27	1.8	1.6	....	1.7	.9	1.2	2.3	2.2	2.2	2.2
28	1.8	1.6	2.1	1.65	.9	1.2	2.3	2.1	2.3	2.1
29	1.8	1.6	....	1.55	.9	1.2	2.2	2.3	2.3	2.1
30	1.8	1.6	....	1.5	.9	1.2	2.2	2.2	2.2	2.1
31	1.9	....	....	....	.9	1.2	....	2.0	....	....

NOTE.—Gage heights distorted by ice Mar. 16 to 22 and Nov. 5 to Dec. 30.

Daily discharge, in second-feet, of Dry Fork of Marias River near Valier, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	24	3.8	20	3.8	0.0	0.0	19	19
2	....	24	3.8	14	24	8	.0	19	19
3	....	23	3.8	8	24	133	.0	139	12
4	....	22	3.8	1.3	5.9	83	3.8	139	12
5	....	21	3.8	1.3	2.6	24	326	97	12
6	....	19	3.8	3.8	.0	8	429	36	12
7	....	18	3.8	8	.0	24	230	19	12
8	....	16	3.8	24	.0	35	326	19	12
9	....	15	3.8	15	.0	24	141	19	12
10	....	15	3.8	3.8	.0	35	110	19	19
11	....	8	.9	1.3	.0	24	46	12	19
12	....	15	1.0	1.3	.0	15	36	12	19
13	....	15	1.0	1.3	.0	3.8	36	19	19
14	....	8	50	1.3	.0	2.6	32	19	19
15	....	8	366	1.3	.0	1.3	27	19	20
16	32	3.8	238	1.3	.0	.6	23	19	20
17	72	3.8	110	1.3	.0	.0	19	19	21
18	112	3.8	91	1.3	.0	.0	19	12	22
19	153	3.8	72	.0	.0	.0	19	12	23
20	134	1.3	53	.0	.0	.0	19	19	24
21	84	1.3	35	.0	.0	.0	19	27	25
22	35	2.6	33	.0	.0	.0	19	27	26
23	35	2.6	31	.0	.0	.0	27	19	27
24	83	3.8	28	.0	.0	.0	36	12	28
25	35	3.8	26	35	.0	.0	36	12	25
26	35	3.8	24	15	.0	.0	32	12	20
27	15	3.8	35	8	.0	.0	27	19	20
28	15	3.8	46	5.9	.0	.0	27	12	15
29	15	3.8	40	2.6	.0	.0	19	27	15
30	15	3.8	33	1.3	.0	.0	19	19	10
31	24	....	27	....	.0	.0	....	6.5	....

NOTE.—Daily discharge determined from two rating curves: Mar. 23 to Sept. 10, well-defined, and Sept. 11 to Nov. 30, fairly well defined. Discharge estimated Mar. 16 to 22 and Nov. 5 to 30. Discharge interpolated on other days for which gage heights are missing.

Monthly discharge of Dry Fork of Marias River near Valier, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 16-31	153	15.0	55.9	1,770	C.
April	24	1.3	10.0	595	B.
May	366	0.9	44.5	2,740	B.
June	35	0	5.91	352	B.
July	24	0	1.95	120	B.
August	133	0	13.6	836	B.
September	429	0	70.1	4,170	C.
October	139	6.5	28.4	1,750	C.
November	28	10	18.6	1,110	D.
December			10	615	D.
The period				14,100	

NOTE.—Mean for December estimated.

TETON RIVER AT STRABANE,[1] MONT.

Location.—In the SE. ¼ NE. ¼ sec. 35, T. 25 N., R 7 W., 1 mile north of Peeble's ranch, 16 miles above Chouteau, Mont., at Strabane post office.

Records available.—November 26, 1904, to December 31, 1906; January 16, 1908, to December 31, 1911.

Drainage area.—140 square miles.

Gage.—The original gage was spiked to a post on the left bank about 40 feet above the bend of Kroff's irrigation ditch. On March 9, 1905, it was moved by the observer to a point 250 feet upstream to avoid the effect of the dam erected at the head of the ditch below. On May 8, 1905, the gage was referred to the bench marks and it was found that the datum had been raised 0.7 foot in moving; the difference between the level of the water surface at the old site and that at the new was 0.20 foot; on May 8, 1906, the gage was again moved 1½ miles upstream to Mr. Bjornstad's ranch and set at an entirely different datum. The station was discontinued during 1907, and when it was reestablished in 1908 a standard chain gage was installed on the left bank. On March 23, 1911, a new station was established one-half mile downstream from old gage.

Channel.—Shifts at high stages; current swift.

Discharge measurements.—At flood stages, made from cable one-fourth mile above the gage; at low stages, by wading at various sections.

Winter flow.—Not affected by ice.

Diversions and storage.—Practically no water is diverted above the station, but the ordinary flow below the station is appropriated and used for irrigation. An irrigation project now being constructed under the Carey Act will store the flood water of Teton River in the reservoir about 5 miles north of the gaging section. The capacity of the reservoir is 90,000 acre-feet, and it can be increased to 210,000 acre-feet by raising the top of the dam 20 feet. The reservoir will serve 120,000 acres of land on the north side of the river. The water will be diverted half a mile above the gage.

Accuracy.—Accurate determination of discharge during high stages is difficult because of the shifting channel.

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[1] Station was described in earlier reports as "Teton River near Belleview, Mont." Post office was moved from Belleview to Strabane in 1910.

Discharge measurements of Teton River at Strabane, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 21[a]	A. S. Heidel	....	24	June 21	W. A. Lamb	3.90	177
Mar. 23	.....do	3.05	46	Aug. 8	R. Richards	3.55	128
May 13	B. E. Jones	3.96	198	Oct. 19	B. E. Jones	3.48	110
May 17	.....do	4.66	518				

[a] Ice conditions.

Daily gage height, in feet, of Teton River at Strabane, Mont., for 1911.

[Belle Peebles, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		3.05	3.40	4.30	3.80	3.75	3.30	3.50	3.45	3.20
2		3.05	3.40	4.40	3.80	3.75	3.30	3.50	3.45	3.20
3		3.00	3.45	4.60	3.70	3.75	3.35	3.45	3.50	3.20
4		2.95	3.45	4.80	3.70	3.80	3.40	3.45	3.50	3.15
5		2.95	3.90	4.50	3.65	3.75	3.40	3.45	3.45	3.15
6		2.95	4.10	4.35	3.65	3.70	3.40	3.50	3.45	3.15
7		2.90	4.10	3.30	3.65	3.60	3.45	3.50	3.40	3.15
8		2.95	4.15	4.30	3.65	3.55	3.45	3.55	3.40	3.10
9		2.95	4.10	4.40	3.65	3.50	3.45	3.55	3.35	3.05
10		3.00	4.00	4.40	3.85	3.50	3.50	3.50	3.35	3.05
11		3.00	4.00	4.50	3.85	3.50	3.50	3.50	3.30	3.05
12		3.00	3.95	4.40	3.90	3.40	3.50	3.45	3.30	3.10
13		2.95	4.00	4.30	3.90	3.45	3.55	3.45	3.20	3.15
14		2.95	4.30	4.20	3.85	3.45	3.55	3.45	3.20	3.15
15		2.95	4.60	4.35	3.85	3.40	3.50	3.45	3.15	3.15
16		2.90	5.00	4.30	3.80	3.40	3.50	3.45	3.05	3.10
17		2.90	4.70	4.32	3.75	3.45	3.50	3.45	3.05	3.10
18		2.90	4.50	4.25	3.75	3.45	3.55	3.50	3.10	3.10
19		3.00	4.40	4.20	3.75	3.45	3.55	3.50	3.20	3.10
20		3.00	4.30	3.95	3.70	3.40	3.50	3.50	3.30	3.05
21		3.05	4.30	3.90	3.70	3.40	3.50	3.55	3.30	3.05
22		3.05	4.30	3.95	3.70	3.35	3.55	3.60	3.30	3.05
23	3.05	3.10	4.20	4.00	3.65	3.35	3.55	3.60	3.40	3.05
24	3.05	3.25	4.25	4.00	3.65	3.35	3.60	3.60	3.45	3.00
25	3.10	3.22	4.25	4.05	3.65	3.30	3.55	3.60	3.45	3.00
26	3.10	3.55	4.25	4.00	3.60	3.30	3.55	3.60	3.40	3.00
27	3.08	3.55	4.25	3.95	3.60	3.25	3.50	3.55	3.30	3.00
28	3.00	3.55	4.20	3.92	3.65	3.25	3.50	3.55	3.20	3.00
29	3.00	3.45	4.11	3.90	3.65	3.25	3.45	3.55	3.25	2.95
30	3.00	3.45	4.05	3.80	3.70	3.30	3.45	3.50	3.25	2.90
31	3.05		4.15		3.70	3.30		3.50		2.90

Daily discharge, in second-feet, of Teton River at Strabane, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		47	96	315	168	158	80	112	104	66
2		47	96	365	168	158	80	112	104	66
3		41	104	490	148	158	88	104	112	66
4		36	104	620	148	168	96	104	112	60
5		36	190	425	139	158	96	104	104	60
6		36	237	340	139	148	96	112	104	60
7		30	237	315	139	130	104	112	96	60
8		36	254	315	139	121	104	121	96	53
9		36	237	365	139	112	104	121	88	47
10		41	212	365	179	112	112	112	88	47
11		41	212	425	179	112	112	112	80	47
12		41	201	365	190	96	112	104	80	53
13		36	212	315	190	104	121	104	66	60
14		36	315	272	179	104	121	104	66	60
15		36	490	340	179	96	112	104	60	60
16		30	750	315	168	96	112	104	47	53
17		30	555	325	158	104	112	104	47	53
18		30	425	294	158	104	121	112	53	53
19		41	365	272	158	104	121	112	66	53
20		41	315	201	148	96	112	112	80	47
21		47	315	190	148	96	112	121	80	47
22		47	315	201	148	88	121	130	80	47
23	47	53	272	212	139	88	121	130	96	47
24	47	73	294	212	139	88	130	130	104	41
25	53	66	294	224	139	80	121	130	104	41
26	53	121	294	212	130	80	121	130	96	41
27	51.	121	294	201	130	73	112	121	80	41
28	41	121	272	194	139	73	112	121	80	41
29	41	104	240	190	139	73	104	121	73	36
30	41	104	224	168	148	80	104	112	73	30
31	47		254		148	80		112		30

NOTE.—Daily discharge determined from a rating curve fairly well defined below 215 second-feet.

Monthly discharge of Teton River at Strabane, Mont., for 1911.

[Drainage area, 140 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a] 35	0.250	0.29	2,150	D.
February			[a] 30	.214	.22	1,670	D.
March			38.4	.274	.32	2,360	C.
April	121	30	53.6	.383	.43	3,190	B.
May	750	96	280	2.00	2.31	17,200	B.
June	620	168	301	2.15	2.40	17,900	B.
July	190	130	154	1.10	1.27	9,470	B.
August	168	73	108	.771	.89	6,640	B.
September	130	80	109	.779	.87	6,490	B.
October	130	104	114	.814	.94	7,010	B.
November	112	47	84.0	.600	.67	5,000	B.
December	66	30	50.5	.361	.42	3,110	B.
The year			113	.807	11.03	82,200	

[a] Estimated.

NOTE.—Mean discharge for period Mar. 1 to 22, estimated at 35 second-feet.

DEEP CREEK NEAR CHOTEAU, MONT.

Location.—At Hugh Robinson's ranch, in the SW. ¼ NW. ¼ sec. 15, T. 15 N., R. 5 W., 5 miles southwest of Choteau, Mont.

Records available.—March 24, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Standard chain on right bank.

Channel.—Clean and fairly permanent; bed composed of gravel; gravel bar about 50 feet below the gage forms the control.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—A few small ditches divert water from the creek.

Accuracy.—Records fair.

Discharge measurements of Deep Creek near Choteau, Mont., in 1910—11.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1910.				May 14	B. E. Jones	5.91	84
Oct. 2	U. S. R. S. Engineers	1.10	28.7	18	.....do	6.60	259
10	.....do	1.10	25.1	June 21	W. A. Lamb	6.10	117
17	.....do	1.05	24.4	Aug. 7	R. Richards	6.04	96
1911.				Oct. 19	B. E. Jones	5.70	42
Mar. 24[a]	J. C. Beebe	5.87	76	25	W. A. Lamb	5.70	42

[a] New gage—new datum.

Daily gage height, in feet, of Deep Creek near Choteau, Mont., for 1911.

[Hugh Robinson, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	5.7	5.8	6.1	6.35	5.8	5.6	5.7	5.6
2	....	5.7	5.7	6.2	6.15	5.8	5.5	5.75	5.55
3	....	5.7	5.7	6.3	6.2	6.0	5.6	5.85	5.55
4	....	5.6	5.8	6.4	6.15	6.0	5.8	5.75	5.55
5	....	5.6	5.8	6.4	6.0	6.05	6.3	5.8	5.7
6	....	5.6	6.0	6.3	6.05	6.3	6.3	5.7	5.75
7	....	5.6	6.0	6.3	5.9	6.1	6.3	5.7	5.7
8	....	5.7	6.0	6.4	6.0	6.1	6.0	5.7	5.7
9	....	5.7	6.0	6.5	6.0	6.05	6.0	5.7	5.9
10	....	5.7	6.0	6.3	5.8	5.9	5.85	5.8	6.0
11	....	5.7	6.0	6.4	5.8	6.0	5.9	5.65	5.9
12	....	5.7	5.9	6.2	5.8	5.8	5.8	5.65	....
13	....	5.7	5.9	6.3	5.8	5.8	5.75	5.65	....
14	....	5.7	5.8	7.0	5.8	5.8	5.75	5.65	....
15	....	5.6	6.6	6.5	5.8	5.8	5.7	5.75	....
16	....	5.6	7.3	6.7	6.4	5.7	5.8	5.65	....
17	....	5.7	6.9	6.3	6.1	5.8	5.7	5.65	....
18	....	5.7	6.6	6.2	6.0	5.65	5.8	5.65	....
19	....	5.7	6.4	6.1	5.9	5.75	5.7	5.65	....
20	....	5.6	6.3	6.1	5.95	5.6	5.8	5.75	....
21	....	5.6	6.3	6.1	5.9	5.7	5.7	5.65	....
22	....	5.7	6.3	6.15	5.8	5.6	5.8	5.65	....
23	....	5.7	6.2	6.2	5.9	5.7	5.7	5.65	....
24	5.9	5.7	6.3	6.4	5.8	5.6	5.75	5.7	....
25	5.8	5.8	6.2	6.35	5.8	5.6	5.75	5.75	....
26	5.8	5.8	6.3	6.2	5.8	5.6	5.75	5.6	....
27	5.7	5.8	6.4	6.1	5.8	5.7	5.8	5.65	....
28	5.7	5.9	6.3	6.15	5.7	5.6	5.7	5.65	....
29	5.7	5.8	6.2	6.05	5.8	5.7	5.7	5.7	....
30	5.7	5.8	6.1	6.2	5.7	5.6	5.7	5.75	....
31	5.7	....	6.1	....	5.75	5.6	....	5.65	....

NOTE.—Gage heights, Nov. 9 to 11, distorted by ice.

Daily discharge, in second-feet, of Deep Creek near Choteau, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	43	58	118	176	58	30	43	30
2	....	43	43	142	130	58	18	50	24
3	....	43	43	162	142	96	30	67	24
4	....	30	58	196	130	96	58	50	24
5	....	30	58	196	96	107	162	58	43
6	....	30	96	162	107	162	162	43	50
7	....	30	96	162	76	118	162	43	43
8	....	43	96	196	96	118	96	43	43
9	....	43	96	227	96	107	96	43	....
10	....	43	96	162	58	76	67	58	....
11	....	43	96	196	58	96	76	36	....
12	....	43	76	142	58	58	58	36	....
13	....	43	76	162	58	58	50	36	....
14	....	43	58	425	58	58	50	36	....
15	....	30	260	227	58	58	43	50	....
16	....	30	582	296	196	43	58	36	....
17	....	43	378	162	118	58	43	36	....
18	....	43	260	142	96	36	58	36	....
19	....	43	196	118	76	50	43	36	....
20	....	30	162	118	86	30	58	50	....
21	....	30	162	118	76	43	43	36	....
22	....	43	162	130	58	30	58	36	....
23	....	43	142	142	76	43	43	36	....
24	76	43	162	196	58	30	50	43	....
25	58	58	142	176	58	30	50	50	....
26	58	58	162	142	58	30	50	30	....
27	43	58	196	118	58	43	58	36	....
28	43	76	162	130	43	30	43	36	....
29	43	58	142	107	58	43	43	43	....
30	43	58	118	142	43	30	43	50	....
31	43	....	118	....	50	30	....	36	....

NOTE.—Daily discharge determined from a well-defined curve.

Monthly discharge of Deep Creek near Choteau, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 24-31	76	43	51	810	B.
April	76	30	43.1	2,560	B.
May	582	43	147	9,040	B.
June	425	107	170	10,100	B.
July	196	43	84.0	5,160	B.
August	162	30	62.0	3,810	B.
September	162	18	63.3	3,770	B.
October	67	30	42.5	2,610	B.
November	50	....	27.7	1,650	C.
December	....	....	[a] 15.0	922	D.
The period	....	....	....	40,400	

[a] Estimated.

NOTE.—Mean discharge for period Nov. 12 to 30 estimated at 25 second-feet.

MUSSELSHELL RIVER BASIN.

NORTH FORK OF MUSSELSHELL RIVER NEAR DELPINE, MONT.

Location.—In the SE. ¼ SW. ¼ sec. 35, T. 10 N., R. 9 E., at a proposed dam site 3 miles above Delpine, Mont., and about 16 miles northeast of Martinsdale, Mont.

Records available.—May 19, 1909, to December 31, 1911.

Drainage area.—Not measured.

Gage.—A staff near left bank nailed to foot log which spans the stream; datum unchanged.

Channel.—Gravel.

Discharge measurements.—Made from foot log or by wading.

Diversions and storage.—Several ditches take water for irrigation. The drainage area above the station affords an excellent reservoir site; 28,000 acre-feet of water may be stored with a 130-foot dam at the station.

Discharge measurements of North Fork of Musselshell River near Delpine, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 16	C. S. Heidel	Ice	7.8	June 5	C. S. Heidel	1.89	25
Apr. 9	do	1.76	18.9	Aug. 3	do	1.57	9.5
May 5	do	1.77	17.9	Oct. 28	do	1.54	7.9

Daily gage height, in feet, of North Fork of Musselshell River near Delpine, Mont., for 1911.

[Thomas Harbor, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		2.05	1.71	1.97	1.64	1.52	1.43	1.34
2		1.80	1.72	1.81	1.62	1.66	1.43	1.34
3		1.75	1.70	1.77	1.62	1.57	1.43	1.39
4		1.75	1.70	1.91		1.62	1.43	1.39
5		1.80	1.70	1.89	1.62	1.57	1.41	1.39
6		1.80	1.71	1.81	1.60		1.38	1.39
7		1.70	1.78	1.88	1,57	1.57	1.38	1.39
8		1.68	1.78	1.96	1.55	1.57	1.38	1.39
9		1.76	1.80	1.99	1.52	1.55	1.36	1.39
10		1.71	1.80	1.83	1.52	1.52	1.33	1.39
11		1.70	1.75	1.86	1.52	1.53	1.33	1.39
12		1.73	1.78	1.82	1.52	1.50	1.33	1.39
13		1.71	1.76	1.83	1.52	1.50	1.34	1.41
14		1.70	1.75	1.86	1.47	1.50	1.33	1.41
15		1.60	1.90	1.91	1.52	1.48	1.33	1.39
16	1.60	1.62	1.75	1.88	1.55	1.46	1.33	1.39
17	1.60	1.65	1.78	1.81	1.57	1.46	1.33	1.39
18	1.40	1.68	1.76	1.76	1.57	1.43	1.33	1.39
19	1.85	1.65	1.75	1.77	1.57	1.43	1.33	1.39
20	2.07	1.68	1.66	1.76	1.57	1.43	1.33	1.39
21	2.15	1.71	1.69	1.69	1.59	1.43	1.34	
22	2.30	1.74	1.71	1.69	1.57	1.43		
23	2.45	1.71	1.71	1.61	1.57	1.43	1.34	
24	2.25	1.80	1.91	1.61	1.57	1.44	1.34	
25	2.20	1.72	2.09		1.55	1.45	1.34	
26	2.15	1.81	2.04	1.66	1.49	1.44		
27	1.73	1.90	1.98	1.66	1.49	1.43	1.34	
28	1.70	1.74	1.81	1.66	1.52	1.44	1.34	
29	1.75	1.72	1.84	1.66	1.52	1.43	1.34	
30	2.05	1.70	1.79	1.69	1.52	1.43	1.34	
31	2.10		1.77		1.52	1.43		

Daily discharge, in second-feet, of North Fork of Musselshell River near Delpine, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	36	16	30	12	7.6	5.6	4.1
2	....	20	16	21	11	13	5.6	4.1
3	....	18	15	18	11	9.1	5.6	4.8
4	....	18	15	27	11	11	5.6	4.8
5	....	20	15	25	11	9.1	5.2	4.8
6	....	20	16	21	10	9.1	4.7	4.8
7	....	15	19	25	9.1	9.1	4.7	4.8
8	....	14	19	30	8.5	9.1	4.7	4.8
9	....	18	20	31	7.6	8.5	4.4	4.8
10	....	16	20	22	7.6	7.6	4.0	4.8
11	....	15	18	24	7.6	7.9	4.0	4.8
12	....	16	19	21	7.6	7	4.0	4.8
13	....	16	18	22	7.6	7	4.1	5.2
14	....	15	18	24	6.4	7	4.0	5.2
15	....	10	26	27	7.6	6.6	4.0	4.8
16	10	11	18	25	8.5	6.2	4.0	4.8
17	10	12	19	21	9.1	6.2	4.0	4.8
18	5	14	18	18	9.1	5.6	4.0	4.8
19	23	12	18	18	9.1	5.6	4.0	4.8
20	38	14	13	18	9.1	5.6	4.0	4.8
21	44	16	14	14	9.7	5.6	4.1	....
22	57	17	16	14	9.1	5.6	4.1	....
23	71	16	16	10	9.1	5.6	4.1	....
24	52	20	27	10	9.1	5.8	4.1	....
25	48	16	39	12	8.5	6.0	4.1	....
26	44	21	35	13	6.8	5.8	4.1	....
27	16	26	31	13	6.8	5.6	4.1	....
28	15	17	21	13	7.6	5.8	4.1	....
29	18	16	22	13	7.6	5.6	4.1	....
30	36	15	20	14	7.6	5.6	4.1	....
31	40	....	18	....	7.6	5.6	....	....

NOTE.—Daily discharge determined from a rating curve fairly well defined below 32 second-feet. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of North Fork of Musselshell River near Delpine, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	7.0	430	D.
February	....	....	6.0	333	D.
March	71	....	17.5	1,080	C.
April	36	10	17.0	1,010	B.
May	39	13	19.8	1,220	B.
June	31	10	19.8	1,180	B.
July	12	6.4	8.71	536	B.
August	13	5.6	7.11	437	B.
September	5.6	4.0	4.37	260	B.
October	5.2	4.1	4.67	287	C.
November	....	....	4.5	268	D.
December	....	....	4.5	277	D.
The year	....	....	10.1	7,320	

NOTE.—Means for January, February, November, and December estimated. Discharge Mar. 1 to 15 estimated at 5 second-feet per day, and Oct. 21 to 31 at 4.5 second-feet.

NORTH FORK OF MUSSELSHELL RIVER NEAR MARTINSDALE, MONT.

Location.—In sec. 6, T. 8 N., R. 12 E., half a mile above the junction of the North and South Forks, at the ranch of Martin J. Settle, 4 miles north of Martinsdale.

Records available.—May 10, 1907, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain attached to left bank just above observer's private wagon bridge; datum unchanged.

Channel.—Composed of gravel; may shift somewhat during high-water, as current is swift.

Discharge measurements.—Made from the private wagon bridge or by wading.

Winter flow.—Affected by ice.

Storage.—Under a Carey Act project the water of the North Fork, which is practically all appropriated, will be stored at a point about 20 miles above the station and used to irrigate land between Martinsdale and Harlowton.

Accuracy.—Records obtained during open season are very good.

Discharge measurements of North Fork of Musselshell River near Martinsdale, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 17	C. S. Heidel	(a)	18.4	June 4	C. S. Heidel	4.28	152
Apr. 8	.....do	3.50	37	July 28	.....do	3.15	9.4
May 6	.....do	3.78	74	Oct. 27	.....do	3.66	55

[a] Ice conditions.

Daily gage height, in feet, of North Fork of Musselshell River near Martinsdale, Mont., for 1911.

[Martin J. Settle, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	3.6	3.7	4.4	3.45	3.3	3.25	3.35	3.6
2	....	3.7	3.7	4.8	3.5	3.45	3.25	3.35	3.6
3	....	3.6	3.7	4.5	3.45	3.45	3.3	3.35	3.55
4	....	3.6	3.7	4.4	3.4	3.45	3.3	3.35	3.45
5	....	3.5	3.8	4.25	3.4	3.65	3.3	3.4	3.4
6	....	3.5	3.8	4.15	3.4	3.9	3.3	3.4	3.45
7	....	3.5	3.8	4.1	3.35	3.75	3.3	3.35	3.45
8	....	3.5	3.8	4.0	3.35	3.55	3.3	3.35	3.45
9	....	3.6	3.7	4.0	3.35	3.5	3.3	3.35	3.65
10	....	3.65	3.7	3.85	3.3	3.65	3.25	3.35	3.9
11	....	3.65	3.6	3.85	3.3	3.5	3.25	3.35	4.2
12	....	3.5	3.6	3.8	3.25	3.45	3.25	3.35	3.9
13	....	3.5	3.6	3.75	3.2	3.4	3.3	3.35	3.85
14	....	3.5	3.6	3.75	3.5	3.35	3.25	3.35	3.9
15	....	3.5	3.7	3.7	3.5	3.4	3.25	3.35	4.5
16	....	3.6	4.0	3.85	3.1	3.4	3.25	3.35	4.5
17	....	3.65	3.8	3.7	3.25	3.4	3.25	3.35	3.95
18	....	3.65	3.8	3.7	3.25	3.35	3.25	3.35	....
19	....	3.6	3.75	3.65	3.25	3.35	3.3	3.4	....
20	3.9	3.6	3.7	3.6	3.15	3.3	3.3	3.4	....
21	4.0	3.7	3.65	3.65	3.2	3.3	3.3	3.4	....
22	3.9	3.75	3.6	3.7	3.25	3.3	3.3	3.4	....
23	3.9	3.7	3.65	3.6	3.25	3.35	3.35	3.4	....
24	4.0	3.65	4.0	3.45	3.2	3.35	3.35	3.4	....
25	3.8	3.7	4.65	3.4	3.15	3.35	3.35	3.45	....
26	3.6	3.7	4.6	3.4	3.15	3.35	3.35	3.55	....
27	3.6	3.8	4.45	3.4	3.15	3.35	3.35	3.55	....
28	3.4	3.9	4.3	3.45	3.15	3.3	3.35	3.55	....
29	3.0	3.8	4.3	3.5	3.1	3.3	3.35	3.7	....
30	3.7	3.7	4.3	3.45	3.45	3.3	3.35	3.45	....
31	3.7	....	4.25	....	3.3	3.25	....	3.45	....

NOTE.—Gage heights Nov. 9 to 17 distorted by ice.

Daily discharge, in second-feet, of North Fork of Musselshell River near Martinsdale, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		48	60	173	32	19	16	23	48
2		60	60	248	37	32	16	23	48
3		48	60	191	32	32	19	23	42
4		48	60	173	27	32	19	23	32
5		37	74	146	27	54	19	27	27
6		37	74	129	27	89	19	27	32
7		37	74	121	23	67	19	23	32
8		37	74	105	23	42	19	23	32
9		48	60	105	23	37	19	23	
10		54	60	82	19	54	16	23	
11		54	48	82	19	37	16	23	
12		37	48	74	16	32	16	23	
13		37	48	67	12	27	19	23	
14		37	48	67	37	23	16	23	
15		37	60	60	37	27	16	23	
16		48	105	82	7	27	16	23	
17		54	74	60	16	27	16	23	
18		54	74	60	16	23	16	23	
19		48	67	54	16	23	19	27	
20	89	48	60	48	9.5	19	19	27	
21	105	60	54	54	12	19	19	27	
22	89	67	48	60	16	19	19	27	
23	89	60	54	48	16	23	23	27	
24	105	54	105	32	12	23	23	27	
25	74	60	218	27	9.5	23	23	32	
26	48	60	209	27	9.5	23	23	42	
27	48	74	182	27	9.5	23	23	42	
28	27	89	155	32	9.5	19	23	42	
29	3	74	155	37	7	19	23	60	
30	60	60	155	32	32	19	23	32	
31	60		146		19	16		32	

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of North Fork of Musselshell River near Martinsdale, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			20	1,230	D.
February			18	1,000	D.
March	105		41.0	2,520	C.
April	89	37	52.2	3,110	B.
May	218	48	89.3	5,490	B.
June	248	27	83.4	4,960	B.
July	37	7	19.6	1,210	B.
August	89	16	30.6	1,880	B.
September	23	16	19.1	1,140	B.
October	60	23	27.9	1,720	B.
November			28.1	1,670	C.
December			20	1,230	D
The year	248		37.5	27,200	

NOTE.—Means for January, February, and December estimated; mean for period Mar. 1 to 19 estimated at 25 second-feet; mean for period Nov. 9 to 30 estimated at 25 second-feet.

MUSSELSHELL RIVER AT HARLOWTON, MONT.

Location.—In sec. 26, T. 8 N., R. 15 E., at the highway bridge 1 mile south of Harlowton. Takes place of station formerly maintained at Shawmut.

Records available.—July 11, 1907, to December 31, 1911.

Drainage area.—Not measured.

Gages.—The original gage was destroyed in October, 1908; on April 10, 1909, a temporary staff gage was installed which read 0.73 foot too high. On May 24, 1909, a standard chain gage was placed on the upstream side of the new public highway bridge at a datum 0.52 foot higher than the bench mark and the datum of the bench mark was raised 0.52 foot. All gage heights for 1909 were corrected to the new datum.

Channel.—Bed of stream composed of sand and gravel; will probably shift in flood.

Discharge measurements.—Made from bridge or by wading.

Diversions.—A large part of the valley is irrigated and many small ditches take water from the Musselshell; practically the entire flow of the stream is appropriated. A minimum discharge of 2 second-feet is recorded during the irrigation season at this station.

Discharge measurements of Musselshell River at Harlowton, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 14[a]	C. S. Heidel	0.80	54	July 27	C. S. Heidel	−0.02	11
Apr. 7	do	.91	118	Oct. 26	do	.81	80
June 3	do	4.10	2,580				

[a] Ice at gage.

Daily gage height, in feet, of Musselshell River at Harlowton, Mont., for 1911.

[W. G. Yamamoto, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		0.92	1.25	2.70	1.12	0.35	0.44	0.70	0.48
2		.98	1.20	3.55	1.08	.52	.35	.70	.55
3		1.08	1.20	4.05	.98	.55	.32	.70	.65
4		1.10	1.20	3.75	.92	.58	.52	.70	.65
5		1.10	1.20	3.30	.88	.72	.66	.70	.72
6		1.00	1.25	3.05	.80	1.15	.70	.70	.75
7		.98	1.60	2.85	.80	1.00	.70	.70	.75
8		.95	1.60	2.70	.80	1.00	.70	.70	.52
9		.98	1.60	2.60	.80	1.00	.70	.70	.55
10		1.01	1.68	2.50	.78	1.00	.70	.70	.55
11		1.04	1.58	2.40	.75	.95	.69	.70	.50
12	0.90	1.01	1.45	2.30	.68	.95	.65	.70	.50
13	.90	1.00	1.40	2.25	.64	.90	.65	.70	
14	.90	.95	1.45	2.20	.60	.82	.64	.70	
15	.90	.95	1.98	2.30	.54	.78	.62	.70	
16	.90	.90	2.40	2.20	.50	.75	.60	.72	
17	.90	.92	2.20	2.15	.48	.75	.59	.74	
18	1.00	.98	2.05	2.00	.45	.72	.52	.75	
19	1.12	1.00	1.95	1.95	.40	.70	.49	.75	
20	1.18	1.00	1.75	1.80	.35	.70	.45	.78	
21	1.30	1.00	1.68	1.75	.30	.66	.59	.78	
22	1.50	1.02	1.60	1.70	.22	.65	.68	.78	
23	1.50	1.18	1.70	1.65	.15	.60	.65	.80	
24	1.40	1.20	1.95	1.55	.10	.60	.65	.80	
25	1.38	1.15	2.35	1.48	.05	.60	.68	.80	
26	1.25	1.15	2.65	1.28	.00	.60	.70	.80	
27	1.20	1.28	2.60	1.20	−.02	.60	.70	.82	
28	1.10	1.40	2.40	1.18	−.04	.55	.70	.82	
29	1.08	1.40	2.30	1.15	−.05	.55	.70	.72	
30	1.02	1.30	2.30	1.15	−.10	.50	.70	.65	
31	.98		2.30		+.55	.50		.56	

Daily discharge, in second-feet, of Musselshell River at Harlowton, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	110	220	1,200	168	30	38	68	42
2	....	125	200	2,010	154	46	30	68	50
3	....	154	200	2,540	125	50	28	68	62
4	....	160	200	2,210	110	53	46	68	62
5	....	160	200	1,760	101	71	63	68	71
6	....	130	220	1,520	85	180	68	68	76
7	....	125	370	1,340	85	130	68	68	76
8	....	118	370	1,200	85	130	68	68	46
9	....	118	370	1,110	85	130	68	68	50
10	....	123	412	1,020	82	130	68	68	50
11	....	142	360	940	76	118	67	68	44
12	105	133	300	860	65	118	62	68	44
13	105	130	280	820	60	105	62	68	....
14	105	118	300	780	55	89	60	68	....
15	105	118	616	860	48	82	58	68	....
16	105	105	940	780	44	76	55	71	....
17	105	110	780	740	42	76	54	75	....
18	130	125	665	630	39	71	46	76	....
19	168	130	595	595	34	68	43	76	....
20	192	130	460	490	30	68	39	82	....
21	240	130	412	460	27	63	54	82	....
22	320	136	370	430	22	62	65	82	....
23	320	192	430	400	18	55	62	85	....
24	280	200	595	345	16	55	62	85	....
25	272	180	900	312	14	55	65	85	....
26	220	180	1,160	232	12	55	68	85	....
27	200	232	1,110	200	11	55	68	89	....
28	160	280	940	192	10	50	68	89	....
29	154	280	860	180	10	50	68	71	....
30	136	240	860	180	8	50	68	62	....
31	125	....	860	....	50	50	....	51	....

NOTE.—Daily discharge determined from a rating curve fairly well defined below 320 second-feet.

Monthly discharge of Musselshell River at Harlowton, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a] 45	2,770	D.
February	....	....	[a] 50	2,780	D.
March	320	....	131	8,060	C.
April	280	105	154	9,160	B.
May	1,160	200	534	32,800	C.
June	2,540	180	878	52,200	C.
July	168	8	57.1	3,510	B.
August	180	30	78.1	4,800	B.
September	68	28	58.0	3,450	B.
October	89	51	73.1	4,490	B.
November	....	....	46.0	2,740	C.
December	....	....	[a] 40.0	2,460	D.
The year	....	....	179	129,000	

[a] Estimated.

NOTE.—Discharge Mar. 1-11 estimated at 65 second-feet and Nov. 13 to 30 at 40 second-feet.

CHECKERBOARD CREEK NEAR DELPINE, MONT.

Location.—In the SW. ¼ SW. ¼ sec. 4, T. 9 N., R. 9 E., 2½ miles above the junction of Checkerboard Creek with Musselshell River, 8 miles from Delpine post office, and 21 miles from Martinsdale, Mont.

Records available.—May 26, 1909, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff, nailed to a foot log near the right bank. This was superseded on April 9, 1911, by a vertical staff set at a different datum about 40 feet downstream at a better section.

Channel.—Gravel.

Discharge measurements.—Made from foot log or by wading.

Winter flow.—Affected by ice.

Diversions.—It is proposed to divert the water from this creek over a small divide into the reservoir on the North Fork of Musselshell River. The creek is about 12 miles long and has no tributaries.

Discharge measurements of Checkerboard Creek near Delpine, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 16	C. S. Heidel	0.30	3.0	June 5	C. S. Heidel	3.00	41
Apr. 9[a]	do	.52	7.4	Aug. 3	do	2.18	5.6
Apr. 9	do	2.34	7.7	Oct. 28	do	2.08	3.7
May 5	do	2.47	13.1				

[a] Last measurement at old gage.

Daily gage height, in feet, of Checkerboard Creek near Delpine, Mont., for 1911.

[Thomas Harbor, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1				3.30	2.20	2.19	2.15	2.15
2		0.50	2.28	3.15	2.20	2.30		2.15
3		.50	2.31			2.18	2.15	
4		.50	2.30	3.20			2.15	2.12
5		.50	2.47	3.00	2.18		2.15	
6		.50	2.55	2.98	2.18		2.15	2.10
7		.50	2.60	2.98	2.18	2.18	2.15	2.10
8		.50	2.70	2.95	2.18	2.18		2.12
9		2.34	2.71	2.97	2.20	2.18		
10			2.75	2.80	2.20	2.18	2.15	2.12
11		2.20	2.61	2.72	2.22	21.8		
12		2.23	2.60	2.75	2.23	2.18	2.15	2.12
13		2.25	2.47	2.71	2.25	2.18		
14		2.22	2.50	2.62	2.25	2.18	2.15	2.12
15		2.21	2.80	2.68	2.25	2.16		
16	0.30	2.22	2.75	2.62	2.25	2.16	2.15	2.12
17	.30	2.25			2.25		2.15	
18	.30	2.23	2.70	2.60	2.25	2.16		2.12
19	.35	2.18	2.70	2.62	2.25	2.15	2.15	
20	.40		2.71	2.60	2.23			2.10
21	.40	2.18	2.52	2.60	2.23	2.15	2.15	
22	.50	2.20		2.55	2.22	2.15		
23	.50	2.23	2.60	2.50	2.22	2.15	2.15	
24	.50	2.18	2.75	2.40	2.22	2.15	2.15	
25	.50	2.24	2.80		2.21	2.15		
26	.50	2.26	2.85	2.37	2.20	2.15	2.15	
27	.50	2.33	2.83	2.37	2.20	2.15		
28	.50	2.25	2.80	2.38		2.15	2.15	2.08
29	.50	2.27	2.80	2.40	2.19	2.15	2.15	
30	.50	2.26	2.83	2.38		2.15	2.15	
31	.50		2.85			2.15		

Daily discharge, in second-feet, of Checkerboard Creek near Delpine, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	7.0	7.4	64	5.8	5.6	4.9	4.9
2	....	7.0	7.6	52	5.8	8.0	4.9	4.9
3	....	7.0	8.2	54	5.6	5.4	4.9	4.6
4	....	7.0	8.0	56	5.6	5.4	4.9	4.4
5	....	7.0	13	41	5.4	5.4	4.9	4.2
6	....	7.0	16	40	5.4	5.4	4.9	4.0
7	....	7.0	18	40	5.4	5.4	4.9	4.0
8	....	7.0	22	38	5.4	5.4	4.9	4.4
9	....	9.0	23	39	5.8	5.4	4.9	4.4
10	....	7.4	25	28	5.8	5.4	4.9	4.4
11	....	5.8	18	23	6.2	5.4	4.9	4.4
12	....	6.5	18	25	6.5	5.4	4.9	4.4
13	....	6.9	13	23	6.9	5.4	4.9	4.4
14	....	6.2	14	19	6.9	5.4	4.9	4.4
15	....	6.0	28	21	6.9	5.1	4.9	4.4
16	3.0	6.2	25	19	6.9	5.1	4.9	4.4
17	3.0	6.9	24	18	6.9	5.1	4.9	4.4
18	3.0	6.5	22	18	6.9	5.1	4.9	4.4
19	4.0	5.4	22	19	6.9	4.9	4.9	4.2
20	5.0	5.4	23	18	6.5	4.9	4.9	4.0
21	5.0	5.4	15	18	6.5	4.9	4.9	4.0
22	7.0	5.8	16	16	6.2	4.9	4.9	4.0
23	7.0	6.5	18	14	6.2	4.9	4.9	3.9
24	7.0	5.4	25	10.5	6.2	4.9	4.9	3.9
25	7.0	6.7	28	9.9	6.0	4.9	4.9	3.8
26	7.0	7.1	31	9.8	5.8	4.9	4.9	3.8
27	7.0	8.8	30	9.8	5.8	4.9	4.9	3.7
28	7.0	6.9	28	10.5	5.7	4.9	4.9	3.7
29	7.0	7.3	28	10.5	5.6	4.9	4.9	3.7
30	7.0	7.1	30	10.5	5.6	4.9	4.9	3.7
31	7.0	....	31	....	5.6	4.9	....	3.7

NOTE.—Daily discharge determined as follows: Mar. 16 to Apr. 8 (old section) and Apr. 9 to Oct. 28 (new section) from rating curves fairly well defined. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Checkerboard Creek near Delpine, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	3.0	184	D.
February	....	....	3.0	167	D.
March	7.0	....	4.5	277	C.
April	9.0	5.4	6.71	399	B.
May	31.0	7.4	20.5	1,260	B.
June	64.0	9.8	25.8	1,540	B.
July	6.9	5.4	6.09	374	B.
August	8.0	4.9	5.24	322	B.
September	4.9	4.9	4.90	292	B.
October	4.9	3.7	4.18	257	C.
November	....	....	3.5	208	D.
December	....	....	3.5	215	D.
The year	64	....	7.58	5,500	

NOTE.—Means for January, February, November, and December estimated; mean for period Mar. 1–15 estimated at 3.0 second-feet.

SOUTH FORK OF MUSSELSHELL RIVER NEAR MARTINSDALE, MONT.

Location.—In the S. ½ sec. 12, T. 8 N., R. 11 E., near the public highway, 1¼ miles northeast of Martinsdale, near the blacksmith's shop of the Martinsdale Sheep Co., at a point about 1½ miles above the original site, which was near the ranch of M. J. Settle.

Records available.—June 19, 1907, to April 28, 1908 (old station); April 28, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff nailed to tree on the right bank; datum unchanged. The datum of this gage bears no determined relation to the datum of the gage at the original station.

Channel.—Bed of stream is chiefly gravel and is clean and nonshifting.

Discharge measurements.—Made by wading near the gage or from a bridge 150 feet below.

Winter flow.—Affected by ice.

Diversions.—Many small ditches take water from the creek and during the irrigating season all the water is diverted.

Accuracy.—Open season records good.

Discharge measurements of South Fork of Musselshell River near Martinsdale, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 17	C. S. Heidel	(a)	6.8	June 4	C. S. Heidel	5.75	1,180
Apr. 8	do	1.75	41	July 28	do	0.90	3.2
May 6	do	3.01	174	Oct. 27	do	1.55	25

a Ice conditions.

Daily gage height, in feet, of South Fork of Musselshell River near Martinsdale, Mont., for 1911.

[J. G. Wallace, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		2.05	2.4	4.5	2.1	0.8	1.15	1.3
2		2.35	2.4	5.8	2.0	0.9	1.5	1.4
3		2.05	2.3	5.8	1.95	0.9	1.5	1.4
4		1.55	2.5	5.8	1.9	1.5	1.3	1.4
5		1.5	2.5	5.7	1.8	1.5	1.3	1.45
6		1.65	2.6	5.1	1.25	1.5	1.35	1.45
7		1.65	3.3	4.9	1.4	1.3	1.3	1.5
8		1.75	3.2	4.8	1.3	1.4	1.3	1.5
9		2.0	3.5	4.8	1.0	1.5	1.3	1.5
10		2.0	3.3	4.4	1.0	1.6	1.3	1.5
11		2.15	3.3	4.2	1.0	1.6	1.25	1.5
12		2.0	3.0	4.0	1.0	1.65	1.2	1.5
13		1.9	3.3	4.0	0.95	1.6	1.2	1.5
14		1.8	3.3	4.2	0.8	1.65	1.2	1.5
15		1.8	4.0	3.9	0.8	1.5	1.2	1.5
16		1.8	4.9	3.9	0.8	1.5	1.2	1.5
17		1.9	4.2	3.7	0.8	1.4	1.2	1.55
18		1.9	4.0	3.0	0.8	1.4	1.25	1.55
19	2.05	2.0	3.7	3.1	0.85	1.4	1.25	1.55
20	2.1	2.0	5.5	3.1	0.8	1.45	1.25	1.5
21	2.65	2.2	3.3	3.0	0.8	1.45	1.25	1.5
22	2.75	2.2	3.2	2.9	0.8	1.3	1.2	1.5
23	2.05	2.3	3.2	2.0	0.8	1.35	1.25	1.5
24	2.05	2.3	3.6	2.8	0.8	1.35	1.25	1.4
25	2.0	2.3	4.8	2.5	1.5	1.3	1.25	1.4
26	1.05	2.4	4.6	2.4	1.0	1.2	1.25	1.45
27	1.05	2.45	4.6	2.35	0.9	1.2	1.25	1.55
28	1.55	2.5	4.4	2.3	0.9	1.25	1.25	1.55
29	1.85	2.5	4.3	2.2	0.9	1.2	1.25	1.55
30	1.4	2.5	4.2	2.15	0.85	1.15	1.3	1.6
31	1.55		4.0		0.85	1.15		1.75

Daily discharge, in second-feet, of South Fork of Musselshell River near Martinsdale, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		66	104	555	71	2	9.5	15
2		98	104	1,260	62	3	24	19
3		66	92	1,260	58	3	24	19
4		27	116	1,260	53	24	15	19
5		24	116	1,200	45	24	15	22
6		34	128	846	13	24	17	22
7		34	231	740	19	15	15	24
8		41	214	690	15	19	15	24
9		62	268	690	5	24	15	24
10		62	231	516	5	30	15	24
11		76	231	447	5	30	13	24
12		62	183	390	5	34	11	24
13		53	231	390	4	30	11	24
14		45	231	447	2	34	11	24
15		45	390	363	2	24	11	24
16		45	740	363	2	24	11	24
17		53	447	312	2	19	11	27
18		53	390	183	2	19	13	27
19	66	62	312	198	2.5	19	13	27
20	71	62	1,080	198	2	22	13	24
21	134	81	231	183	2	22	13	24
22	148	81	214	168	2	15	11	24
23	66	92	214	62	2	17	13	24
24	66	92	289	154	2	17	13	19
25	62	92	690	116	24	15	13	19
26	6.5	104	597	104	5	11	13	22
27	6.5	110	597	98	3	11	13	27
28	27	116	516	92	3	13	13	27
29	49	116	480	81	3	11	13	27
30	19	116	447	76	2.5	9.5	15	30
31	27		390		2.5	9.5		41

NOTE.—Daily discharge determined from 1910 rating curve that is well defined.

Monthly discharge of South Fork of Musselshell River near Martinsdale, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 10	615	D.
February			[a] 7	389	D.
March	148		35.8	2,200	C.
April	116	24	69.0	4,110	A.
May	1,080	92	339	20,800	A.
June	1,260	62	448	26,700	A.
July	71	2	13.7	842	A.
August	34	2	18.5	1,140	A.
September	24	9.5	13.8	821	A.
October	41	15	24.0	1,480	A.
November			[a] 18.0	1,070	D.
December			[a] 12.0	738	D.
The year	1,260	2	84.1	60,900	

[a] Estimated.

NOTE.—Discharge Mar. 1 to 18 estimated at 20 second-feet.

AMERICAN FORK NEAR HARLOWTON, MONT.

Location.—At the Shaw & Elliott ranch, 5 miles southeast of Harlowton, Mont., a few miles above the junction of the American Fork with the Musselshell.

Records available.—July 28, 1907, to December 31, 1911.

Gage.—Chain fastened to upper rail of small wagon bridge; datum unchanged.

Channel.—Bed composed of sand and clay; shifts only at extremely high stages.

Discharge measurements.—Made from the bridge or by wading.

Winter flow.—Affected by ice.

Storage.—The basin of the American Fork affords some good storage sites and by holding back the spring flood waters, which are derived from the melting snow on the mountains, much more land can be put under irrigation.

Accuracy.—Open season records good.

Discharge measurements of American Fork near Harlowton, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 14	C. S. Heidel	(a)	0.9	June 3	C. S. Heidel	3.77	544
Apr. 7	.....do	1.32	3.2	Oct. 26	.....do	1.20	2.5

[a] Ice conditions.

Daily gage height, in feet, of American Fork near Harlowton, Mont., for 1911.

[Jesse Cunningham, observer]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		1.3	1.3	2.9	1.15			1.2	1.15
2		1.3	1.3	3.65	1.15	1.15		1.2	1.15
3		1.3	1.25	3.75	1.15	1.05		1.15	1.15
4		1.3	1.25	3.7	1.05	1.15		1.2	1.15
5		1.3	1.25	3.6	1.45	1.15		1.25	1.15
6		1.3	1.2	3.55	0.95	1.1	1.45	1.2	
7		1.3	1.2	3.55	1.05	1.05	1.05	1.25	
8		1.2	1.2	2.75	1.15	1.15	1.1	1.2	
9		1.25	1.25	2.75	1.45	1.2	1.15	1.2	
10		1.3	1.3	2.5	0.95	1.15	1.1	1.2	
11		1.25	1.3	2.4	0.95	1.15	1.1	1.25	
12		1.25	1.3	2.55	0.95	1.1	1.1	1.2	
13		1.25	1.2	2.35	0.95	1.1	1.05	1.15	
14		1.25	1.25	2.4	0.9	1.05	1.05	1.2	
15		1.25	1.45	2.35	0.9	1.05	1.05	1.2	
16		1.2	2.65	2.4	0.9	0.95	0.95	1.1	
17		1.25	2.55	2.2	0.9	0.9	0.95	1.2	
18		1.3	2.4	2.0	1.0	0.9	1.45	1.2	
19		1.3	2.1	1.85	0.95	0.85	1.45	1.2	
20		1.3	1.9	1.85	0.95		1.05	1.1	
21		1.25	1.85	1.8	0.9		1.05	1.2	
22		1.3	1.8	1.85	0.8		1.05	1.2	
23		1.35	1.55	1.75	0.85		1.1	1.15	
24		1.35	1.8	1.75	0.8		1.1	1.2	
25		1.3	2.5	1.1		0.9	1.15	1.2	
26	1.35	1.25	2.65	1.1		0.95	1.2	1.2	
27	1.3	1.35	2.85	1.2	0.5	1.05	1.15	1.1	
28	1.3	1.4	2.6	1.2		1.05	1.15	1.1	
29	1.3	1.35	2.6	1.3		0.95	1.2	1.1	
30	1.3	1.3	2.4	1.2		0.85	1.2	1.1	
31	1.35		2.55					1.15	

Daily discharge, in second-feet, of American Fork near Harlowton, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		3.5	3.5	220	1.8	0.9	1.8	2.0	1.8
2		3.5	3.5	490	1.8	1.8	3.0	2.0	1.8
3		3.5	2.8	535	1.8	1.2	4.2	1.8	1.8
4		3.5	2.8	510	1.2	1.8	5.4	2.0	1.8
5		3.5	2.8	470	8.0	1.8	6.7	2.8	1.8
6		3.5	2.0	450	.8	1.5	8 0.	2.0	
7		3.5	2.0	450	1.2	1.2	1.2	2.8	
8		2.0	2.0	182	1.8	1.8	1.5	2.0	
9		2.8	2.8	182	8.0	2.0	1.8	2.0	
10		3.5	3.5	130	.8	1.8	1.5	2.0	
11		2.8	3.5	112	.8	1.8	1.5	2.8	
12		2.8	3.5	140	.8	1.5	1.5	2.0	
13		2.8	2.0	104	.8	1.5	1.2	1.8	
14		2.8	2.8	112	.7	1.2	1.2	2.0	
15		2.8	8.0	104	.7	1.2	1.2	2.0	
16		2.0	160	112	.7	.8	.8	1.5	
17		2.8	140	81	.7	.7	.8	2.0	
18		3.5	112	34	1.0	.7	8.0	2.0	
19		3.5	67	37	.8	.6	8.0	2.0	
20		3.5	42	37	.8	.6	1.2	1.5	
21		2.8	37	32	.7	.6	1.2	2.0	
22		3.5	.32	37	.5	.6	1.2	2.0	
23		4.8	13	28	.6	.7	1.5	1.8	
24		4.8	32	28	.5	.7	1.5	2.0	
25		3.5	130	1.5	.0	.7	1.8	2.0	
26	4.8	2.8	160	1.5	.0	.8	2.0	2.0	
27	3.5	4.8	208	2.0	.0	1.2	1.8	1.5	
28	3.5	6.0	150	2.0	.0	1.2	1.8	1.5	
29	3.5	4.8	150	3.5	.0	.8	2.0	1.5	
30	3.5	3.5	112	2.0	.0	.6	2.0	1.5	
31	4.8		140		.0	.6		1.8	

NOTE.—Daily discharge determined from a rating curve that is fairly well defined. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of American Fork near Harlowton, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 1.00	61	D.
February			[a] .90	50	D.
March	4.8		1.57	97	D.
April	6.0	2.0	3.45	205	C.
May	208	2.0	55.9	3,440	C.
June	535	1.5	155	9,220	C.
July	8.0	.0	1.20	74	C.
August	2.0	.6	1.13	69	C.
September	8.0	.8	2.58	154	C.
October	2.8	1.5	1.95	120	C.
November			[a] 1.00	60	D.
December			[a] 1.00	61	D.
The year	535		18.8	13,600	

[a] Estimated.

NOTE.—Discharge Mar. 1 to 25 estimated at 1 second-foot.

LEBO CREEK NEAR HARLOWTON, MONT.

Location.—Near the Shaw & Elliott ranch, 5 miles southeast of Harlowton, half a mile above the junction of the creek with American Fork.

Records available.—July 28, 1907, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff on the right bank, nailed to the pile of the small wagon bridge; its datum is the same as that of the gage on the American Fork.

Channel.—Contains growth of grass.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—The water of the stream is used for irrigation.

Accuracy.—Records only fair as gage heights are affected by backwater caused by grass in the stream bed.

Lebo Creek is about 20 miles long, is fed by springs, and its flow is nearly uniform.

Discharge measurements of Lebo Creek near Harlowton, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 14[a]	C. S. Heidel	....	21	July 27	C. S. Heidel	.98	7.3
Apr. 7	.....do	1.28	24	Oct. 26	.....do	1.40	22
June 3	.....do	1.85	42				

[a] Creek frozen at gage.

Daily gage height, in feet, of Lebo Creek near Harlowton, Mont., for 1911.

[Neva Clark, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1.2	1.15	1.9	1.0	1.15	1.25	1.25	1.45
2	....	1.2	1.1	2.15	1.0	1.15	1.3	1.25	1.35
3	....	1.15	1.5	1.85	.95	1.15	1.35	1.25	1.25
4	....	1.2	1.1	1.7	.9	1.2	1.35	1.25	1.25
5	....	1.15	1.1	1.65	.9	1.2	1.3	1.25	1.15
6	....	1.25	1.1	1.6	.9	1.25	1.4	1.25	....
7	....	1.3	1.1	1.55	.95	1.15	1.35	1.25	....
8	....	1.25	1.0	1.4	1.0	1.3	1.35	1.25	....
9	....	1.2	1.1	1.4	.95	1.45	1.3	1.15	....
10	....	1.2	1.15	1.35	.9	1.4	1.25	1.15	....
11	....	1.1	1.5	1.3	.9	1.35	1.25	1.15	....
12	....	1.1	1.5	1.35	.9	1.45	1.25	1.15	....
13	....	1.1	1.1	1.4	1.5	1.4	1.25	1.15	....
14	....	1.1	1.1	1.4	1.0	1.45	1.25	1.15	....
15	....	1.1	1.1	1.45	1.5	1.45	1.25	1.15	....
16	....	1.0	1.25	1.55	1.0	1.4	1.25	1.15	....
17	....	1.0	1.15	1.5	.95	1.4	1.25	1.25	....
18	....	1.0	1.1	1.4	.8	1.4	1.25	1.25	....
19	....	1.0	1.1	1.4	.8	1.4	1.25	1.25	....
20	....	1.1	1.5	1.4	.8	1.35	1.2	1.25	....
21	....	1.1	1.5	1.45	.75	1.35	1.25	1.25	....
22	....	1.15	1.5	1.4	.65	1.3	1.25	1.25	....
23	....	1.15	1.2	1.35	.65	1.3	1.3	1.25	....
24	....	1.15	1.3	1.35	.65	1.3	1.3	1.3	....
25	....	1.1	2.6	1.2	.7	1.35	1.25	1.3	....
26	1.4	1.1	2.6	1.2	.75	1.35	1.25	1.4	....
27	1.3	1.15	2.1	1.15	1.0	1.35	1.2	1.4	....
28	1.3	1.2	2.5	1.1	.95	1.35	1.2	1.45	....
29	1.25	1.2	1.8	1.0	.95	1.3	1.25	1.45	....
30	1.3	1.1	1.8	1.5	1.45	1.3	1.25	1.4	....
31	1.2	....	1.6	....	1.25	1.3	....	1.35	....

NOTE.—Daily discharge determined as follows: Mar. 26 to May 24, from curve poorly defined; May 25 to June 2, by indirect method for shifting channels; June 3 to Nov. 5, from curve fairly well defined.

Daily discharge, in second-feet, of Lebo Creek near Harlowton, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		21	19	50	8	12	16	16	24
2		21	17	64	8	12	18	16	20
3		19	33	40	7	12	20	16	16
4		21	17	34	6	14	20	16	16
5		19	17	32	6	14	18	16	12
6		23	17	30	6	16	22	16	
7		25	17	28	7	12	20	16	
8		23	14	22	8	18	20	16	
9		21	17	22	7	24	18	12	
10		21	19	20	6	22	16	12	
11		17	33	18	6	20	16	12	
12		17	33	20	6	24	16	12	
13		17	17	22	26	22	16	12	
14		17	17	22	8	24	16	12	
15		17	17	24	26	24	16	12	
16		14	23	28	8	22	16	12	
17		14	19	26	7	22	16	16	
18		14	17	22	4	22	16	16	
19		14	17	22	4	22	16	16	
20		17	33	22	4	20	14	16	
21		17	33	24	3	20	16	16	
22		19	33	22	1.5	18	16	16	
23		19	21	20	1.5	18	18	16	
24		19	25	20	1.5	18	18	18	
25		17	88	14	2	20	16	18	
26	29	17	88	14	3	20	16	22	
27	25	19	64	12	8	20	14	22	
28	25	21	80	11	7	20	14	24	
29	23	21	45	8	7	18	16	24	
30	25	17	45	26	24	18	16	22	
31	21		34		16	18		20	

Monthly discharge of Lebo Creek near Harlowton, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 10	615	D.
February			[a] 15	833	D.
March			[a] 20	1,230	D.
April	25	14	18.6	1,110	C.
May	88	14	31.3	1,920	C.
June	64	8	24.6	1,460	B.
July	26	1.5	7.82	481	B.
August	24	12	18.9	1,160	B.
September	22	14	16.9	1,010	B.
October	24	12	16.3	1,000	B.
November			[a] 12	714	D.
December			[a] 10	615	D.
The year	88		16.8	12,100	

[a] Estimated.

FLATWILLOW CREEK NEAR FLATWILLOW, MONT.

Location.—At Flatwillow Ranch Co.'s ranch, 8 miles above Flatwillow and 30 miles north of Roundup.

Records available.—May 3 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff gage, marked to tenths of feet, nailed to a timber driven into bed of stream and braced to the banks; below the wagon bridge near the ranch buildings.

Channel.—Likely to shift; current very sluggish.

Discharge measurements.—At high stages made from a footbridge behind house; at low water made by wading around a bend below house.

Winter flow.—Affected by ice.

Diversions.—Much water is diverted above the gage during the irrigating season. A canal to divert water into the storage reservoir of the Flatwillow Carey project heads about a mile above the station.

Discharge measurements of Flatwillow Creek near Flatwillow, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 3	C. S. Heidel	3.15	23
June 1	do	6.71	253
July 26	do	2.59	4.5
Oct. 25	do	3.15	29

Daily gage height, in feet, of Flatwillow Creek near Flatwillow, Mont., for 1911.

[Lee Akers, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		6.8	3.6	2.8	2.8	2.7	3.1	3.2
2		7.1	3.6	2.9	2.8	2.7	3.0	3.2
3	3.13	7.2	3.4	3.1	2.7	2.7	3.0	3.3
4	3.10	7.2	3.3	3.2	2.7	2.8	3.0	3.3
5	3.11	6.9	3.3	3.2	2.7	2.8	3.0	3.3
6	3.11	6.5	3.1	3.3	2.8	2.9	3.0	3.2
7	3.08	6.2	3.1	3.5	2.8	2.8	3.0	3.3
8	3.12	5.9	3.3	3.6	2.9	2.9	3.0	
9	3.18	5.8	3.3	3.7	2.9	2.9	3.0	
10	3.12	5.8	3.3	3.7	2.9	2.9	3.0	
11	3.11	5.6	3.2	3.6	2.9	2.9	3.0	
12	3.00	5.5	2.9	3.6	2.8	3.0	3.0	
13	3.02	5.3	2.9	3.4	2.8	2.9	3.0	
14	2.86	5.2	2.8	3.4	2.7	3.0	3.1	
15	3.85	5.1	2.9	3.3	2.6	3.2	3.1	
16	6.2	5.1	2.9	3.2	2.6	3.2	2.9	
17	4.3	4.8	2.8	3.2	2.6	3.3	2.9	3.2
18	4.0	4.6	2.8	3.6	2.6	3.4	2.9	3.2
19	3.9	4.4	2.8	3.4	2.7	3.4	2.9	3.2
20	3.8	4.2	2.9	3.4	2.8	3.4	3.0	3.1
21	3.8	4.1	2.8	3.4	2.8	3.2	3.0	3.1
22	3.9	4.2	2.8	3.4	2.8	3.1	3.0	3.1
23	3.8	4.2	2.8	3.3	2.8	3.0	3.0	3.1
24	4.3	4.1	2.8	3.3	2.8	3.1	3.1	3.1
25	5.2	4.0	2.7	3.3	2.8	3.0	3.1	3.1
26	6.6	4.0	2.6	3.3	2.8	3.1	3.3	3.1
27	6.6	3.9	2.6	3.3	2.7	2.9	3.3	3.1
28	6.2	3.9	2.6	3.2	2.7	2.9	3.3	3.1
29	6.2	3.8	2.7	3.1	2.7	2.8	3.3	3.1
30	6.1	3.7	2.7	3.1	2.7	2.9	3.2	3.1
31	6.2		2.7	2.8		3.0		3.1

NOTE.—Gage heights distorted by ice Nov. 24 to Dec. 31.

Daily discharge, in second-feet, of Flatwillow Creek near Flatwillow Mont., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	25	260	47	12	12	8	24
2	25	284	47	16	12	8	20
3	25	292	37	24	8	8	20
4	24	292	32	28	8	12	20
5	24	268	32	28	8	12	20
6	24	236	24	32	12	16	20
7	23	212	24	42	12	12	20
8	25	191	32	47	16	16	20
9	27	184	32	52	16	16	20
10	25	184	32	52	16	16	20
11	24	170	28	47	16	16	20
12	20	163	16	47	12	20	20
13	21	149	16	37	12	16	20
14	14	142	12	37	8	20	24
15	14	135	16	32	5	28	24
16	212	135	16	28	5	28	16
17	85	115	12	28	5	32	16
18	67	103	12	47	5	37	16
19	62	91	12	37	8	37	16
20	57	79	16	37	12	37	20
21	57	73	12	37	12	28	20
22	62	79	12	37	12	24	20
23	57	79	12	32	12	20	20
24	85	73	12	32	12	24	20
25	142	67	8	32	12	20	20
26	244	67	5	32	12	24	20
27	244	62	5	32	8	16	20
28	212	57	5	28	8	16	20
29	212	57	8	24	8	12	20
30	205	52	8	24	8	16	20
31	212	....	8	12	....	20	....

NOTE.—Daily discharge determined from a rating curve not well defined. Discharge estimated for days for which gage heights are missing.

Monthly discharge of Flatwillow Creek near Flatwillow, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	244	14	82.4	5,070	C.
June	292	52	145.0	8.630	C.
July	47	5	19.0	1,170	C.
August	52	12	33.3	2,050	C.
September	16	5	10.4	619	C.
October	37	8	19.8	1,220	C.
November	24	16	19.9	1,180	C.
December	....	....	[a] 20.0	1,230	D.
The period	....	....	....	21,200	

[a] Estimated.

MILK RIVER BASIN.

SOUTH FORK OF MILK RIVER NEAR BROWNING, MONT.

Location.—At Richard Croff's ranch, about 40 miles northeast of Browning, Mont., and about 6 miles south of the Canadian boundary line.

Records available.—April 28, 1905, to December 31, 1911.

Drainage area.—283 square miles.

Gage.—Chain. During the high water of June, 1908, the gage was washed out and was not replaced until July 31, 1908, when the new chain gage was installed at the original site and datum.

Channel.—Permanent.

Discharge measurements.—Made from a cable installed at the time of the installation of the new gage.

Winter flow.—Affected by ice.

Flood discharge.—The river overflows its banks at gage height of 12 feet; highwater marks show that the flood of June, 1908, reached a stage of 15.4 feet on the gage. The flood width was 850 feet and the cross section about 2,600 square feet.

Diversions.—A number of small ditches divert water to irrigate meadow lands in the river bottom; a considerable amount of this water returns to the stream as seepage and waste. No storage is used above the station.

Accuracy.—Records excellent except during the winter months.

Discharge measurements of South Fork of Milk River near Browning, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 9	B. E. Jones	3.54	180
Aug. 29	do	2.71	44

Daily gage height, in feet of South Fork of Milk River near Browning, Mont., for 1911.

[R. J. Croff, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		3.42	3.5	3.9	3.01	2.55	2.95
2		3.45	3.6	3.55	2.96	2.5	2.95
3		3.55	3.6	3.5	3.26	2.45	2.95
4		3.55	3.6	3.4	3.06	3.25	3.05
5		3.75	3.5	3.38	3.21	4.35	3.1
6		3.9	3.5	3.32	3.04	4.35	3.05
7		3.75	3.4	3.16	3.16	4.25	2.95
8		3.5	3.6	3.03	3.21	4.15	2.95
9		3.6	3.7	2.98	3.16	3.8	2.9
10		3.5	3.45	2.98	3.08	3.55	2.9
11		3.5	3.39	2.97	3.12	3.27	2.9
12		3.42	3.34	2.95	2.94	3.15	2.9
13		3.48	3.29	2.89	2.94	3.05	2.9
14		4.2	3.29	2.87	2.76	3.0	2.9
15		4.75	3.27	2.87	2.76	2.95	2.9
16		6.3	3.21	2.89	2.71	2.95	2.9
17		5.15	3.19	3.22	2.71	2.95	2.9
18		4.2	3.14	3.07	2.69	2.95	2.9
19		3.95	3.09	3.27	2.64	2.95	2.9
20		3.8	2.99	3.22	2.61	2.93	2.9
21		3.7	3.18	2.97	2.63	2.9	2.9
22		3.7	3.55	2.97	2.6	3.0	2.95
23	3.9	3.75	3.3	2.95	2.65	3.05	2.95
24	3.9	3.7	4.3	2.95	2.63	3.17	2.95
25	4.0	3.8	5.95	2.89	2.6	3.25	2.9
26	4.15	3.9	4.8	2.82	2.6	3.2	2.45
27	4.0	3.9	3.85	2.77	2.65	3.18	2.45
28	3.65	3.9	3.9	2.77	2.65	2.97	2.55
29	3.5	3.75	3.8	2.72	2.6	3.05	2.7
30	3.42	3.6	3.55	2.79	2.67	2.95	2.65
31		3.55		2.99	2.55		2.65

Daily discharge, in second-feet, of South Fork of Milk River near Browning, Mont., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	154	172	273	80	28	72
2	....	161	195	184	73	23	72
3	....	184	195	172	122	20	72
4	....	184	195	150	88	120	86
5	....	133	172	146	113	400	94
6	....	273	172	134	85	400	86
7	....	133	150	104	104	372	72
8	....	172	195	84	113	342	72
9	....	195	220	76	104	246	65
10	....	172	161	76	91	184	65
11	....	172	148	75	97	124	65
12	....	154	138	72	71	102	65
13	....	168	128	64	71	86	65
14	....	357	128	61	48	79	65
15	....	520	124	61	48	72	65
16	....	1,040	113	64	43	72	65
17	....	648	109	115	43	72	65
18	....	357	101	90	41	72	65
19	....	286	92	124	36	72	65
20	....	246	78	115	33	60	65
21	....	220	108	75	35	65	65
22	....	220	184	75	32	79	72
23	273	233	130	72	37	86	72
24	273	220	386	72	35	106	72
25	300	246	918	64	32	120	65
26	342	273	536	55	32	111	20
27	300	273	260	49	37	99	20
28	208	273	273	49	37	75	28
29	172	233	246	44	32	86	42
30	154	195	184	51	39	72	37
31	....	184	....	78	28	....	37

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of South Fork of Milk River near Browning, Mont., for 1911.

[Drainage area, 283 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April 23-30	....	....	253	.894	0.27	4,010	A.
May	1,040	133	267	.943	1.09	16,400	A.
June	918	78	207	.731	.82	12,300	A.
July	273	44	94.3	.333	.38	5,800	A.
August	122	28	60.6	.214	.25	3,730	A.
September	400	20	128	.452	.50	7,620	A.
October	94	20	62.5	.221	.25	3,840	A.
The period	....	....	....	....	....	53,700	

MILK RIVER AT HAVRE, MONT.

Location.—In SE. ¼ SE. ¼ sec. 5, T. 32 N., R. 16 E., at the highway bridge over Milk River at Havre, Mont.

Records available.—May 15, 1898, to December 31, 1911.

Drainage area.—About 7,300 square miles.

Gage.—Chain fastened to bridge rail on the downstream side; datum unchanged.

Channel.—Shifts.

Discharge measurements.—Made from bridge or by wading.

Winter flow.—From the last part of November to the first part of April the river at Havre is frozen entirely over and in portions of the cross sections it is usually frozen to the bottom.

Diversions.—An irrigation company in southern Alberta, Can., has been granted an appropriation of 500 second-feet of the low-water flow and 1,500 second-feet of the high-water flow, and a canal of 330 second-feet capacity has been partially constructed but no water has been diverted. There are no other important irrigation rights above Havre, but farther downstream are five large canal systems supplied directly from Milk River and irrigating about 22,000 acres. Preliminary steps toward the adjudication of the water rights of these various systems have been taken. A suit in behalf of the Fort Belknap Indians was decided in their favor with the result that they were given a prior right over the other canals to 125 second-feet, the priority of the other rights not being touched upon. Although no provision for storage has been made by the above claimants, the entire unappropriated flow of the stream has been filed upon by the United States Reclamation Service in connection with its Milk River irrigation project now under construction.

Accuracy.—Frequent discharge measurements are necessary to properly define the rating curve, and even with these the estimates are subject to considerable error. In years of low precipitation the flow ceases entirely and the water stands in pools for several months.

Discharge measurements of Milk River at Havre, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 15	W. A. Lamb	6.98	541	June 26	J. C. Beebe	7.22	745
28	J. C. Beebe	7.29	657	28	do	9.11	2,030
May 3	do	[a] 6.30	135	July 4	do	7.30	715
3	do	[a] 6.60	304	8	do	6.70	334
6	do	6.16	244	27	do	5.83	86
23	do	7.13	579	Aug. 2	do	5.72	78
30	do	6.72	366	31	R. Richards	5.48	42
June 17	do	6.11	174	Oct. 12	W. A. Lamb	6.50	253

[a] Sand bar under gage; gage height of no value.

Daily gage height, in feet, of Milk River at Havre, Mont., for 1911.

[U. S. Weather Bureau, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	6.8	7.1	6.6	7.3	5.7	5.4	6.3	6.2
2	....	6.8	6.9	6.6	8.3	5.7	5.4	6.5	....
3	....	6.7	6.8	6.7	8.2	5.8	5.4	6.6	....
4	....	6.7	6.3	6.7	7.4	5.8	5.4	6.6	6.1
5	....	6.6	6.1	6.6	7.1	5.7	8.7	6.9	6.2
6	....	6.2	6.4	6.5	7.1	5.9	9.6	7.2	6.1
7	....	6.1	6.1	6.3	7.1	5.9	10.3	7.1	6.2
8	....	6.8	6.1	6.4	6.8	6.0	9.0	6.5	....
9	6.2	6.6	6.1	6.6	6.7	6.1	8.5	6.5	....
10	5.9	6.5	6.4	6.7	6.6	6.1	8.1	6.4	....
11	5.7	6.3	6.3	6.3	6.4	6.1	7.2	6.6	....
12	5.7	6.4	6.5	6.3	6.3	6.3	6.9	6.5	....
13	5.7	6.4	6.3	6.2	6.3	6.7	6.7	6.6	....
14	....	6.8	6.2	6.1	6.2	6.4	7.3	6.5	....
15	....	7.1	6.3	6.1	6.1	6.3	7.2	6.5	....
16	....	6.9	6.4	6.3	6.1	6.4	7.0	6.4	....
17	....	6.6	6.5	6.2	6.1	6.1	6.9	6.5	....
18	6.2	6.5	6.6	6.2	6.0	6.0	6.7	6.4	....
19	6.5	6.5	8.5	6.1	6.0	6.0	6.7	6.5	....
20	6.7	6.4	8.2	6.1	5.9	5.9	6.6	6.3	....
21	6.8	6.3	7.4	6.2	6.0	5.7	6.5	6.4	....
22	7.2	6.3	7.2	6.2	5.9	5.7	6.6	6.4	....
23	6.8	6.3	7.1	6.3	5.9	5.7	6.7	6.5	....
24	7.8	6.2	6.8	6.2	5.9	5.6	6.7	6.4	....
25	7.8	6.3	6.9	6.3	5.8	5.6	6.7	6.5	....
26	7.6	6.5	6.8	6.7	5.8	5.6	6.6	6.4	....
27	7.5	7.0	6.9	7.5	5.8	5.6	6.7	6.3	....
28	7.3	7.2	6.8	9.5	5.8	5.5	6.4	6.2	....
29	7.2	6.9	6.7	8.3	5.7	5.5	6.5	6.3	....
30	7.1	7.0	6.9	7.8	5.7	5.4	6.3	6.1	....
31	7.0	....	6.7	....	5.6	5.4	....	6.2	....

Daily discharge, in second-feet, of Milk River at Havre, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	10	410	575	315	710	70	35	210	180
2	30	410	460	315	1,420	70	35	275	171
3	50	360	410	360	1,340	85	35	315	163
4	70	360	210	360	780	85	35	315	155
5	90	315	155	315	575	70	1,720	460	180
6	110	180	240	275	575	105	2,410	640	155
7	130	155	155	210	575	105	2,980	575	180
8	150	410	155	240	410	130	1,940	275	....
9	180	315	155	315	360	155	1,570	275	....
10	105	275	240	360	315	155	1,270	240	....
11	70	210	210	210	240	155	640	315	....
12	70	240	275	210	210	210	460	275	....
13	70	240	210	180	210	360	360	315	....
14	90	410	180	155	180	240	710	275	....
15	110	575	210	155	155	210	640	275	....
16	130	460	240	210	155	240	515	240	....
17	150	315	275	180	155	155	460	275	....
18	180	275	315	180	130	130	360	240	....
19	275	275	1,570	155	130	130	360	275	....
20	360	240	1,340	155	105	105	315	210	....
21	410	210	780	180	130	70	275	240	....
22	640	210	640	180	105	70	315	240	....
23	410	210	575	210	105	70	360	275	....
24	1,060	180	410	180	105	55	360	240	....
25	1,060	210	460	210	85	55	360	275	....
26	920	275	410	360	85	55	315	240	....
27	850	515	460	850	85	55	360	210	....
28	710	640	410	2,330	85	45	240	180	....
29	640	460	360	1,420	70	45	275	210	....
30	575	515	460	1,060	70	35	210	155	....
31	515	....	360	....	55	35	....	180	....

NOTE.—Daily discharge determined from a rating curve fairly well defined below 850 second-feet. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Milk River at Havre, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March	1,060		330	20,300	C.
April	640	155	329	19,600	B.
May	1,570	155	416	25,600	B.
June	2,330	155	394	23.400	B.
July	1,420	55	313	19,200	B.
August	360	35	115	7,070	B.
September	2,980	35	664	39,500	B.
October	640	155	281	17,300	B.
November	180		97	5,770	C.
December			[a] 40	2,460	D.
The period				180,000	

[a] Estimated.

NOTE.—Discharge Nov. 8 to 30 estimated at 75 second-feet per day.

MILK RIVER AT MALTA, MONT.

Location.—In the NW. ¼ sec. 17, T. 30 N., R. 30 E., at the highway bridge at Malta, Mont.

Records available.—July 31, 1902, to December 31, 1911.

Drainage area.—About 14,000 square miles.

Gage.—Chain fastened to handrail on downstream side of bridge; datum unchanged.

Channel.—Sandy; shifts during floods.

Discharge measurements.—Made from bridge or by wading.

Winter flow.—More or less ice present during winter months.

Diversions.—The entire run-off from the drainage area above does not pass the station, for between Havre and Malta seven irrigation canals, which irrigate about 25,000 acres of land, divert water from Milk River and its tributaries. The United States Reclamation Service has under construction a diversion dam at Dodson about 17 miles above the station, which will divert water for the irrigation of about 108,000 acres of land in Milk River valley. East of Malta there are two canals, one on each side, the combined discharge being 1,000 second-feet.

Discharge measurements of Milk River at Malta, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 14	J. C. Beebe	1.75	155	July 1	J. C. Beebe	4.38	1,560
29	do	1.62	115	2	do	4.13	1,380
May 18	do	1.47	67	3	do	3.56	972
June 13	do	2.05	208	31	do	1.24	34
30	do	1.02	17.9	Oct. 10	W. A. Lamb	2.98	557

Daily gage height, in feet, of Milk River at Malta, Mont., for 1911.

[H. P. Clark, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2.35	1.27	2.75	4.4	1.20	1.20	2.75	....
2	....	2.45	2.40	2.60	3.9	1.13	1.15	2.70	1.80
3	....	2.25	2.40	2.55	3.35	1.10	1.15	2.70	....
4	....	2.15	2.45	2.40	3.1	1.07	1.25	2.65	1.95
5	....	2.05	2.35	2.35	3.5	1.05	1.45	2.65	2.15
6	....	1.95	2.20	2.25	3.45	1.05	5.2	2.70	....
7	....	1.90	2.05	2.25	2.95	1.03	7.0	2.85	1.55
8	....	1.85	1.95	2.30	2.85	1.80	10.2	2.80	....
9	....	1.75	1.83	2.15	2.85	0.97	12.3	2.95	....
10	....	1.75	1.75	2.05	2.75	1.00	12.8	3.05	....
11	....	1.75	....	2.00	2.50	0.97	11.4	2.85	....
12	....	1.75	....	2.00	2.10	1.03	8.4	2.70	....
13	....	1.85	1.50	2.00	1.90	1.10	6.2	2.70	....
14	....	1.75	1.50	1.90	1.57	1.15	5.0	2.65	....
15	....	1.70	1.50	1.80	1.35	1.15	4.5	2.65	....
16	....	1.70	1.47	1.67	1.30	1.70	4.4	2.55	....
17	....	1.70	1.40	1.50	1.27	2.00	4.0	2.55	....
18	....	1.55	1.57	1.27	1.20	2.07	3.75	2.45	....
19	....	1.55	1.63	1.20	1.23	2.00	3.40	2.50	....
20	....	1.60	1.85	1.13	1.25	1.90	3.15	2.35	....
21	....	1.45	1.80	1.10	1.20	1.95	3.05	2.35	....
22	....	1.25	3.30	1.05	1.20	1.80	2.95	2.35	....
23	....	....	3.45	.95	1.15	1.65	2.90	2.35	....
24	....	....	3.10	1.65	1.25	1.63	2.75	2.30	....
25	3.25	1.15	2.85	1.45	1.30	1.60	2.80	....	....
26	3.05	1.35	2.75	1.35	1.15	1.63	2.85	2.25	....
27	2.65	1.45	3.90	1.25	1.10	2.05	3.15	2.30	....
28	3.25	1.55	4.0	1.15	2.10	1.87	3.15	....	....
29	3.15	1.63	4.0	1.00	1.50	1.50	3.05	2.35	....
30	2.25	1.63	3.35	3.20	1.30	1.35	2.90	....	....
31	1.75	....	3.05	....	1.25	1.33	....	2.20	....

Daily discharge, in second-feet, of Milk River at Malta, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	309	44	472	1,540	36	36	472	199
2	....	346	327	405	1,210	29	31	448	141
3	....	274	327	385	825	26	31	448	161
4	....	241	346	327	660	24	42	426	181
5	....	210	309	309	930	22	68	426	241
6	....	181	257	274	895	22	2,100	448	164
7	....	167	210	274	572	20	3,320	520	86
8	....	154	181	291	520	141	5,250	495	....
9	....	129	149	241	520	16	6,540	572	....
10	....	129	129	210	472	18	6,860	630	....
11	....	129	112	196	365	16	5,980	520	....
12	....	129	94	195	225	20	4,160	448	....
13	....	154	76	195	167	26	2,780	448	....
14	....	129	76	167	89	31	1,960	426	....
15	....	117	76	141	54	31	1,620	426	....
16	....	117	71	110	47	117	1,540	385	....
17	....	117	60	76	44	195	1,280	385	....
18	....	86	89	44	36	216	1,100	346	....
19	....	86	102	36	39	195	860	365	....
20	....	95	154	29	42	167	692	309	....
21	....	68	141	26	36	181	630	309	....
22	....	42	790	22	36	141	572	309	....
23	....	39	895	15	31	106	545	309	....
24	....	35	660	106	42	102	472	291	....
25	758	31	520	68	47	95	495	282	....
26	630	54	472	54	31	102	520	274	....
27	426	68	1,210	42	26	210	692	291	....
28	758	86	1,280	31	225	159	692	300	....
29	692	102	1,280	18	76	76	630	309	....
30	274	102	825	725	47	54	545	283	....
31	129	....	630	....	42	51	....	257	....

NOTE.—Daily discharge determined from a rating curve well defined below 2,500 second-feet. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Milk River at Malta, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March	758	129	246	15,100	C.
April	346	31	131	7,800	B.
May	1,280	44	384	23,600	B.
June	725	15	183	10,900	B.
July	1,540	26	319	19,600	B.
August	216	16	85.3	5,240	B.
September	6,860	31	1,730	103,000	C.
October	630	257	392	24,100	B.
November	199	....	104	6,190	C.
December	....	....	[a]50	3,070	D.
The period	....	....	....	219,000	

[a] Estimated.

NOTE.—Discharge estimated Mar. 1 to 24 at 165 second-feet per day. Nov. 8 to 30 at 85 second-feet.

MILK RIVER NEAR HINSDALE, MONT.

Location.—At the highway bridge over Milk River about 1 mile from Hinsdale, Mont., a point 46 miles from the junction of Milk River with the Missouri.

Records available.—May 13, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain fastened to upstream side of highway bridge; datum unchanged.

Discharge measurements.—Made from bridge or by wading.

Winter flow.—Stream frozen entirely across and to a considerable depth from late in November until the first of April.

Diversions.—No water is diverted between the station at Hinsdale and that at Malta. The flow of the stream has, however, been appropriated by the United States Reclamation Service in connection with the Milk River project, and will be diverted at a point 9 miles east of Hinsdale to irrigate land in lower Milk River valley.

Discharge measurements of Milk River near Hinsdale, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 15	J. C. Beebe	3.48	775	July [a]2	J. C. Beebe	3.06	633
20	.....do	2.92	480	2	.....do	4.51	1,400
May 17	.....do	2.00	180	Oct. 9	W. A. Lamb	4.06	1,020
June 16	.....do	2.42	254				

[a] Water just beginning to rise. Measurement of no use for discharge curve.

Daily gage height, in feet, of Milk River near Hinsdale, Mont., for 1911.

[Goldie Wooldridge, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		3.6	2.5	3.95	2.6	2.1	1.6	5.7	2.6
2		3.7	2.45	3.9	4.4	1.7	1.55	8.2	2.6
3		3.25	2.7	3.25	4.6	1.3	1.55	9.1	2.55
4		3.3	2.8	3.25	4.2	1.3	1.35	14.6	2.55
5		3.45	2.8	3.25	4.2	1.3	8.15	9.4	2.5
6		3.35	2.75	3.25	4.1	1.3	10.8	6.1	2.5
7		3.4	2.7	3.25	3.9	1.2	20.2	5.4	2.45
8		3.35	2.7	3.2	3.4	1.2	18.2	4.3	
9		3.4	2.55	3.05	3.4	1.2	16.6	4.0	
10		3.25	2.3	2.85	3.2	1.1	14.4	3.9	
11		3.35	2.35	2.55	2.9	1.1	12.1	3.7	
12		3.4	2.4	2.55	2.6	1.0	11.3	3.6	
13		3.25	2.2	2.75	2.35	1.5	9.5	3.4	
14		3.3	2.0	2.55	2.25	1.3	9.6	3.3	
15		3.45	2.05	2.55	2.05	1.3	8.2	3.25	
16		3.85	2.05	2.35	2.05	1.2	6.8	3.2	
17		4.15	2.0	2.15	2.05	1.2	6.5	3.15	
18		3.85	2.0	2.15	2.55	1.2	5.9	3.1	
19		3.15	2.0	2.15	2.35	1.2	5.1	3.0	
20		2.9	1.7	2.15	1.85	2.3	4.7	3.0	
21	2.95	2.9	1.7	2.15	1.35	2.0	4.5	2.9	
22	3.0	2.9	1.55	2.15	1.25	1.95	4.1	2.9	
23	3.65	3.0	1.8		1.35	1.95	3.7	2.9	
24	4.0	3.0	2.15	2.3	1.35	1.85	3.7	2.9	
25	3.65	2.95	2.15	6.6	1.35	1.75	3.6	2.9	
26	3.65	2.8	2.9	4.6	1.45	1.7	3.5	2.8	
27	4.0	2.7	3.3	3.3	1.35	1.65	3.2	2.8	
28	4.15	2.6	3.95	3.1	1.35	1.65	3.1	2.75	
29	4.2	2.55	6.0	2.85	1.35	1.55	3.3	2.7	
30	3.65	2.5	5.95	2.7	2.45	1.45	3.6	2.6	
31	3.7		5.2		2.35	1.7		2.5	

Daily discharge, in second-feet, of Milk River near Hinsdale, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		825	315	1,020	355	177	63	2,170	330
2		880	298	990	1,300	78	56	4,130	330
3		640	395	640	1,430	32	56	4,850	312
4		665	435	640	1,170	32	36	9,250	312
5		742	435	640	1,170	32	4,090	5,090	295
6		690	415	640	1,110	32	6,210	2,470	295
7		715	395	640	990	24	13,700	1,940	276
8		690	395	615	715	24	12.100	1,180	
9		715	335	542	715	24	10,800	1,000	
10		640	245	455	615	18	9,090	940	
11		690	262	335	475	18	7,250	830	
12		715	280	335	355	13	6,610	775	
13		640	210	415	262	50	5,170	675	
14		665	147	335	228	32	5,250	625	
15		742	162	335	162	32	4,130	602	
16		962	162	262	162	24	3,010	580	
17		1,140	147	194	162	24	2,770	558	
18		962	147	194	335	24	2,320	535	
19		590	147	194	262	24	1,740	490	
20		475	78	194	108	245	1,460	490	
21	498	475	78	194	36	147	1,320	450	
22	520	475	56	194	28	134	1,060	450	
23	852	520	97	220	36	134	830	450	
24	1,050	520	194	245	36	108	830	450	
25	852	498	194	2,850	36	88	775	450	
26	852	435	475	1,430	45	78	725	410	
27	1,050	395	665	665	36	70	580	410	
28	1,140	355	1,020	565	36	70	535	390	
29	1,170	335	2,400	455	36	56	625	370	
30	852	315	2,360	395	298	45	775	330	
31	880		1,830		262	78		295	

Note.—Daily discharge determined as follows: Mar. 21 to Sept. 6, well-defined rating curve; Sept. 7 to Nov. 7, from poorly defined curve.

Monthly discharge of Milk River near Hinsdale, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March			507	31,200	C.
April	1,140	315	637	37,900	A.
May	2,400	56	477	29,300	A.
June	2,850	194	561	33,400	A.
July	1,430	28	418	25,700	A.
August	245	13	63.5	3,900	A.
September	13,700	36	3,470	206,000	C.
October	9,250	295	1,410	86,700	C.
November			220	13,100	D.
December			[a] 50	3,070	D.
The period				470,000	

[a] Estimated.

NOTE.—Discharge Mar. 1 to 20 estimated at 300 second-feet per day; Nov. 8 to 30 estimated at 150 second-feet.

NORTH FORK OF MILK RIVER NEAR BROWNING, MONT.

Location.—At Alexander Dubray's ranch, 35 miles north of Browning, and about 2 miles south of the Canadian boundary line.

Records available.—May 8, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff gage nailed to a post on right bank.

Channel.—Liable to shift.

Discharge measurements.—Made by wading at convenient sections near the gage.

Winter flow.—Stream freezes over during the winter; winter gage heights have no value.

Accuracy.—Results are only fair. Estimates of daily and monthly discharge are not published, as no high-water measurements have been made.

Discharge measurements of North Fork of Milk River near Browning, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 8	B. E. Jones	4.93	31	June 25	W. A. Lamb	5.12	54
9	do	4.97	34	Aug. 28	B. E. Jones	4.74	20
June 8	do	4.87	30				

Daily gage height, in feet, of North Fork of Milk River near Browning, Mont, for 1911.

[B. F. Lowry, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	5.0	5.0	4.85	4.5	4.9	4.9
2	....	4.95	4.9	4.85	4.55	4.9	4.9
3	....	4.95	4.9	4.85	5.1	4.9	4.9
4	....	4.9	4.9	4.85	5.45	4.9	4.9
5	....	4.9	4.85	4.93	6.9	4.9	4.9
6	....	4.95	4.85	4.9	6.9	4.9	4.9
7	....	4.9	4.7	4.95	6.85	4.9	4.9
8	4.95	4.85	4.7	4.95	6.8	4.9	....
9	5.0	4.95	4.7	5.0	5.8	4.9	....
10	4.93	4.8	4.7	4.95	5.75	4.9	....
11	4.9	4.8	4.7	4.85	5.65	4.9	....
12	4.95	4.8	4.65	4.7	4.9	4.9	....
13	5.0	4.85	4.65	4.7	4.9	4.9	....
14	5.1	4.8	4.6	4.7	4.9	4.9	....
15	6.25	4.8	4.6	4.65	4.9	4.9	....
16	5.35	4.8	4.6	4.6	4.9	4.9	....
17	5.0	4.8	4.7	4.6	4.9	4.9	....
18	5.1	4.8	4.75	4.6	4.9	4.9	....
19	5.0	4.8	4.75	4.55	4.9	4.9	....
20	4.95	4.8	4.8	4.55	4.9	4.9	....
21	4.95	4.8	4.8	4.55	5.1	4.9	....
22	4.95	4.85	4.8	4.5	5.1	4.9	....
23	5.0	5.0	4.75	4.5	4.9	4.9	....
24	5.0	5.1	4.75	4.5	4.9	4.9	....
25	5.05	5.1	4.7	4.55	4.9	4.9	....
26	5.05	5.15	4.7	4.55	4.9	4.9	....
27	5.0	5.15	4.65	4.5	4.9	4.9	....
28	4.95	5.1	4.65	4.55	4.9	4.9	....
29	4.9	5.05	4.7	4.55	4.9	4.9	....
30	4.9	5.05	4.95	4.5	4.9	4.9	....
31	4.95	....	4.85	4.5	....	4.9	....

NORTH FORK OF MILK RIVER NEAR CHINOOK, MONT.

Location.—In sec. 3, T. 33 N., R. 19 E., at a point about 4½ miles north of Chinook, Mont., about 7 miles above the junction of the North Fork with the main stream.

Records available.—April 22, 1905, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain on the left bank near the house of the observer.

Channel.—Sandy and shifting.

Discharge measurements.—Made by wading or at the cable near the gage.

Winter flow.—Ice present; gage readings impracticable.

Diversions.—Three canals, which divert in the aggregate about 20 second-feet, take out above the station; several small pumping plants, which supply water for irrigating the bottom land along the river valley, also operate above the station. Below the station the Matheson and Cook canals divert water for irrigating land in Milk River Valley near the mouth of the North Fork. The aggregate appropriation for these canals is 78 second-feet.

Accuracy.—Results may be considered reliable as a fair rating curve has been constructed. The greater part of the run-off occurs during floods caused by heavy rains in the spring and early summer. In the fall the channel is often dry.

Discharge measurements of North Fork of Milk River near Chinook, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 11	J. C. Beebe	0.80	34	May 27	J. C. Beebe	0.89	41
22	do	1.83	190	June 12	do	.46	9.9
May 1	do	1.19	63	20	do	.29	3.4
8	do	1.24	79	26	do	.23	2.0
12	do	1.06	59	July 8	do	.27	3.5
22	do	.70	24	Oct. 12	W. A. Lamb	.80	44

Daily gage height, in feet, of North Fork of Milk River near Chinook, Mont., for 1911.

[Mrs. R. B. Snedecor, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Sept.	Oct.	Nov.
1	....	1.36	1.12	0.82	0.20	....	0.90	0.62
2	....	1.18	1.08	.85	.19	....	.94	.64
3	....	1.08	1.02	.84	.18	....	.91	.66
4	....	1.02	1.00	.82	.18	0.85	.88	.68
5	....	.95	1.05	.78	.16	4.6	.84	.70
6	....	1.00	1.05	.72	.15	9.6	.81	.71
7	....	.92	1.05	.70	.15	10.0	.80	.72
8	....	.72	1.20	.68	.35	5.8	.84	.72
9	....	.86	1.20	.59	.48	4.2	.85	.72
10	....	.80	1.19	.54	.51	3.2	.85	.72
11	....	.85	1.16	.50	.45	2.60	.84	.72
12	....	.89	1.08	.50	.34	2.20	.81	....
13	....	.92	.96	.48	.28	1.85	.80	....
14	....	.99	.91	.45	.24	1.65	.79	....
15	....	.96	.95	.44	.20	1.45	.78	....
16	....	1.50	1.04	.42	.19	1.28	.76	....
17	....	1.60	1.08	.41	.16	1.18	.74	....
18	....	1.39	.91	.38	.15	1.12	.72	....
19	....	1.22	.88	.30	.14	1.08	.70	....
20	....	1.20	.81	.29	.11	.99	.70	....
21	....	1.60	.76	.28	.08	.92	.72	....
22	....	1.90	.74	.26	....	.94	.74	....
23	0.55	1.60	.79	.25	....	.98	.74	....
24	.61	1.70	.81	.24	....	1.65	.72	....
25	.52	1.50	.84	.23	....	2.00	.70	....
26	.70	1.60	.90	.22	....	1.90	.69	....
27	.90	1.32	.90	.20	....	1.80	.68	....
28	.85	1.30	.88	.19	....	1.60	.66	....
29	1.25	1.28	.86	.18	....	1.30	.65	....
30	1.28	1.20	.85	.20	....	.95	.64	....
31	1.40	....	.84	....	....	....	.62	....

Daily discharge, in second-feet, of North Fork of Milk River near Chinook, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Sept.	Oct.	Nov.
1	....	95	64	35	2.0	0	52	29
2	....	72	60	37	1.9	0	56	31
3	....	60	53	36	1.8	0	53	32
4	....	53	51	35	1.8	48	50	34
5	....	46	56	31	1.6	1,040	47	35
6	....	51	56	27	1.5	3,060	44	36
7	....	43	56	25	1.5	3,220	43	37
8	....	27	74	24	6	1,500	47	37
9	....	38	74	18	12	895	48	37
10	....	33	73	15	14	560	48	37
11	....	37	69	13	10	392	47	37
12	....	40	60	13	5.6	285	44	....
13	....	43	47	12	3.6	200	43	....
14	....	50	42	10	2.8	156	42	....
15	....	47	46	10	2.0	120	41	....
16	....	117	55	9	1.9	94	40	....
17	....	135	60	8.5	1.6	82	38	....
18	....	100	42	7.2	1.5	74	37	....
19	....	77	39	4.0	1.4	70	35	....
20	....	74	34	3.8	1.1	60	35	....
21	....	135	30	3.6	.8	54	37	....
22	....	206	28	3.2	0	56	38	....
23	16	135	32	3.0	0	59	38	....
24	19	156	34	2.8	0	156	37	....
25	14	117	36	2.6	0	235	35	....
26	25	135	41	2.4	0	211	34	....
27	41	90	41	2.0	0	188	34	....
28	87	87	39	1.9	0	146	32	....
29	80	84	38	1.8	0	97	32	....
30	84	74	37	2.0	0	56	31	....
31	101	....	36	....	0	....	29	....

NOTE.—Daily discharge determined from rating curves as follows: Mar. 23 to July 21, fairly well defined below 115 second-feet; Sept. 4 to Nov. 11, poorly defined.

Monthly discharge of North Fork of Milk River near Chinook, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a] 0	0	
February	....	....	[a] 0	0	
March	101	....	19.1	1,170	C.
April	206	27	81.9	4,870	B.
May	74	28	48.5	2,980	B.
June	37	1.8	13.3	791	B.
July	14	0	2.46	151	B.
August	0	0	0.0	0	
September	3,220	0	437	26,000	C.
October	56	29	40.9	2,510	C.
November	37	....	28.6	1,700	C.
December	....	....	[a] 10.0	[a] 615	
The year	3,220	0	56.4	40,800	

[a] Estimated.

NOTE.—Discharge Mar. 1 to 22 estimated at 8 second-feet per day; Nov. 12 to 30, 25 second-feet. Stream dry July 22 to Sept. 3.

BEAVER CREEK NEAR SACO,[1] MONT.

Location.—In sec. 35, T. 31 N., R. 32 E., at Craig's ranch, 3 miles south of Ashfield, Mont., near Saco, the nearest post office, and about 18 miles from Malta.

Records available.—July 5, 1903, to November 4, 1911.

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[1] Station described in earlier reports as "Beaver Creek near Ashfield, Mont."

Drainage area.—Not measured.

Gage.—Staff. The gage was first established at bridge No. 455 of the Great Northern Railway, half a mile west of Ashfield; it was moved to its present location, 2½ miles farther upstream, December 31, 1903.

Channel.—The stream carries little water except at the times of the spring floods or heavy rains; during the summer months the channel is obstructed by a dense growth of weeds and willows, which have to be cleared out occasionally. At medium and high stages a second channel, known as Beaver Creek Overflow, receives the stream above the station, fills a depression to the west of the main channel, and reenters at a point some distance below the gage.

Discharge measurements.—Made from a cable or by wading.

Winter flow.—Ice present during the winter months.

Diversions.—Water is diverted from Beaver Creek by small ditches leading from the stream and by small pumping plants near the banks.

Accuracy.—Results are only fair, as the growth of weeds and willows in the channel makes the construction of a permanent rating curve difficult. Daily discharge given for days with gage heights only; no monthly estimates have been made.

Discharge measurements of Beaver Creek near Saco, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 14	J. C. Beebe	2.42	15.8	June 30	J. C. Beebe	4.09	79
June 13	.....do	2.39	19.8	July 31	.....do	2.78	31
24	.....do	3.00	39	Oct. 10	W. A. Lamb	3.40	61

Daily gage height, in feet, of Beaver Creek near Saco, Mont., for 1911.

[Mrs. W. P. Craig, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1						2.50		1.90	1.55
2						2.25		1.80	1.55
3						2.15		2.50	1.55
4						2.00		2.95	1.55
5						1.90	2.10	3.9	
6						1.85	3.25	4.8	
7						1.75	4.3		
8						1.70	9.6		
9		2.32				1.65	10.2		
10		2.22					9.8	3.20	
11		2.07					8.2	2.75	
12		2.02					7.5	2.55	
13				2.38			7.2	2.35	
14		2.42		2.23			6.4	2.15	
15				2.13			6.0	2.00	
16				2.08			5.6	2.00	
17				2.08			5.2	2.00	
18				1.98			4.8	2.00	
19				1.98			4.2	2.00	
20				1.98			3.8	1.90	
21				1.98			3.35	1.90	
22				1.88			3.05	1.90	
23	5.7			1.88			2.90	1.90	
24	4.9			3.00			2.85	1.80	
25	4.1			2.12			2.70	1.75	
26	3.8			3.15			2.45	1.60	
27	3.6			4.8			2.30	1.60	
28	3.40		3.90	6.6	2.95		2.20	1.60	
29	3.10		9.00	5.3	3.10		2.15	1.60	
30	2.75		11.40	4.0	3.15		1.95	1.60	
31	2.70		12.00		2.90			1.60	

Daily discharge, in second-feet, of Beaver Creek near Saco, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1						21		6.0	0.5
2						14		4.0	.5
3						11		21	.5
4						8.0		37	.5
5						6.0	10	77	
6						5.0	49	122	
7						3.2	97		
8						2.5	438		
9		16				1.8	486		
10		13					454	47	
11		9.0					339	29	
12		8.4					290	22	
13				17			269	16	
14		19		13			214	11	
15				11			190	8.0	
16				9.6			166	8.0	
17				9.6			142	8.0	
18				7.6			122	8.0	
19				7.6			92	8.0	
20				7.6			72	6.0	
21				7.6			53	6.0	
22				5.4			41	6.0	
23	172			5.4			35	6.0	
24	127			39			33	4.0	
25	87			10			27	3.2	
26	72			45			20	1.0	
27	63			122			15	1.0	
28	55		77	227	37		12	1.0	
29	43		395	148	43		11	1.0	
30	29		582	82	45		7	1.0	
31	27		630		35			1.0	

BEAVER CREEK OVERFLOW NEAR BOWDOIN, MONT.

Location.—In the SW. ¼ sec. 17, T. 30 N., R. 32 E., at John Turmell's ranch, 14 miles from Malta, Mont.

Records available.—June 29, 1903, to August 30, 1906; May 2, 1908, to December 31, 1910; March 20 to November 11, 1911.

Gage.—Staff; datum unchanged.

Channel.—Water flows in this channel only when Beaver Creek is high; during the remainder of the season the water is standing in pools and fluctuations in water level are due wholly to local rains and to evaporation.

Discharge measurements.—At flood stages made at a bridge half a mile below the gage; low-water measurements are made by wading near the gage.

Accuracy.—Records poor. Lack of measurements in 1911 has prevented the making of estimates of daily and monthly discharge.

Discharge measurements of Beaver Creek overflow near Bowdoin, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 13	J. C. Beebe	4.46	0
Oct. 10	W. A. Lamb	4.47	10

Daily gage height, in feet, of Beaver Creek overflow near Bowdoin, Mont., for 1911.

[Henry Turmell, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		3.8	3.1	9.0	4.9	4.1	3.1	3.7	3.5
2		3.7	3.1	7.9	4.8	4.0	3.0	3.6	3.5
3		3.7	3.0	6.8	4.7	3.9	3.0	4.4	3.4
4		3.6	3.0	6.6	4.5	3.8	3.0	4.7	3.4
5		3.5	3.0	5.3	4.3	3.8	3.0	4.1	3.4
6		3.5	3.0	4.8	4.1	3.7	3.3	5.7	3.4
7		3.5	2.9	4.3	3.8	3.7	4.1	5.5	3.4
8		3.4	2.9	4.2	3.8	3.7	7.1	4.9	3.4
9		3.5	2.9	4.2	3.7	3.6	9.2	4.7	3.4
10		3.5	2.9	4.1	3.6	3.5	9.1	4.4	3.3
11		3.6	2.9	4.0	3.6	3.5	9.1	4.3	3.3
12		3.6	2.8	4.3	3.6	3.5	9.1	4.1	
13		3.6	2.8	4.5	3.5	3.4	8.4	3.9	
14		3.7	2.8	4.5	3.5	3.4	7.9	3.8	
15		3.8	2.8	4.4	3.3	3.4	6.5	3.8	
16		4.0	2.8	4.3	3.3	3.4	6.3	3.7	
17		3.9	2.8	4.1	3.3	3.4	6.1	3.7	
18		3.7	2.7	4.0	3.2	3.4	5.8	3.7	
19		3.5	2.7	3.8	3.2	3.4	5.4	3.7	
20	2.4	3.4	2.7	3.8	3.2	3.3	5.0	3.6	
21	2.4	3.4	2.7	3.8	3.1	3.3	4.9	3.6	
22	4.2	3.4	2.7	3.7	3.1	3.3	4.7	3.6	
23	5.2	3.4	2.7	3.7	3.1	3.3	4.5	3.6	
24	5.1	3.4	2.7	6.5	3.1	3.3	4.3	3.6	
25	4.9	3.4	2.7	6.0	3.1	3.2	4.1	3.5	
26	4.5	3.3	2.8	8.1	3.0	3.2	4.0	3.5	
27	4.4	3.3	2.8	7.1	3.0	3.2	3.9	3.5	
28	4.3	3.3	4.7	5.7	3.0	3.1	3.8	3.5	
29	4.1	3.2	8.6	5.3	2.9	3.1	3.7	3.5	
30	4.0	3.1	9.0	4.8	4.3	3.1	3.7	3.5	
31	3.9		9.2		4.3	3.1		3.5	

PORCUPINE CREEK AT NASHUA, MONT.

Location.—In the center of the NW. ¼ sec. 25, T. 28 N., R. 40 E., at the road crossing at Nashua, Mont.

Records available.—July 11, 1908, to October 31, 1911.

Drainage area.—Not measured.

Gage.—Staff, nailed to tree on right bank at the road crossing.

Channel.—Dry in late summer and in winter.

Discharge measurements.—Made by wading near gage.

Diversions and storage.—The water of this stream is neither diverted nor stored.

Discharge measurements of Porcupine River at Nashua, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 19	J. C. Beebe	3.61	14.5
May 16	.....do	3.20	1.5
June 15	.....do	3.01	0.4
Oct. 8	W. A. Lamb	5.55	82

Daily gage height, in feet, of Porcupine Creek at Nashua, Mont., for 1911.

[Mrs. B. H. Burger, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Sept.	Oct.	Nov.
1	....	2.0	3.3	3.45	2.7	....	3.8	4.0
2	....	2.0	3.3	3.4	2.6	....	3.8	3.8
3	....	2.0	3.25	3.5	2.6	....	4.0	....
4	....	1.9	3.25	3.45	2.5	....	....	....
5	....	1.9	3.25	3.4	2.5	....	....	....
6	....	2.0	3.25	3.3	2.5	8.0	8.1	....
7	....	2.0	3.2	3.3	2.5	....	6.4	....
8	....	2.0	3.2	3.25	2.4	....	5.8	....
9	....	1.9	3.2	3.2	....	9.0	5.1	....
10	....	1.9	3.2	3.15	....	7.6	4.9	....
11	....	4.5	3.15	3.1	....	6.0	4.6	....
12	....	3.5	3.15	3.1	....	5.2	4.4	....
13	....	4.3	3.15	3.05	....	4.8	4.3	....
14	....	3.4	3.15	3.05	....	....	4.2	....
15	....	3.1	3.1	3.05	....	....	4.2	....
16	....	....	3.2	3.0	....	7.0	4.1	....
17	....	....	3.2	3.0	....	6.0	4.0	....
18	....	....	3.2	3.0	....	5.2	4.0	....
19	2.4	....	3.1	2.95	....	4.8	3.9	....
20	2.4	3.6	3.1	2.95	....	4.6	3.8	....
21	2.3	3.6	3.1	2.9	....	4.4	3.8	....
22	2.3	3.7	3.1	2.9	....	4.2	3.8	....
23	2.3	3.6	3.1	2.9	....	4.2	3.8	....
24	2.2	3.45	3.2	2.85	....	4.2	3.8	....
25	2.2	3.4	3.2	2.8	....	4.1	3.8	....
26	2.0	3.4	3.25	2.8	....	4.0	3.8	....
27	2.2	3.35	3.3	2.65	....	3.9	3.7	....
28	2.4	3.3	3.7	2.5	....	3.8	3.7	....
29	2.3	3.3	3.6	2.5	....	3.8	3.7	....
30	2.2	3.25	3.6	2.6	....	3.8	3.7	....
31	2.1	....	3.6	....	....	....	3.7	....

Daily discharge, in second-feet, of Porcupine Creek at Nashua, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	Sept.	Oct.
1	....	1.0	4.0	7.8	0	18
2	....	1.0	4.0	6.5	0	18
3	....	1.0	3.0	9.0	0	24
4	....	.5	3.0	7.8	0	347
5	....	.5	3.0	6.5	0	265
6	....	1.0	3.0	4.0	183	187
7	....	1.0	2.0	4.0	347	117
8	....	1.0	2.0	3.0	347	72
9	....	.5	2.0	2.0	224	64
10	....	.5	2.0	1.5	167	56
11	....	83	1.5	1.0	101	45
12	....	43	1.5	1.0	68	38
13	....	74	1.5	.8	52	34
14	....	39	1.5	.8	285	31
15	....	28	1.0	.8	265	31
16	....	25	2.0	0.5	142	28
17	....	22	2.0	.5	101	24
18	....	19	2.0	.5	68	24
19	8.5	16	1.0	.2	52	21
20	8.5	12	1.0	.2	45	18
21	6.0	12	1.0	.0	38	18
22	6.0	15	1.0	.0	31	18
23	6.0	12	1.0	.0	31	18
24	4.0	7.8	2.0	.0	31	18
25	4.0	6.5	2.0	.0	28	18
26	1.0	6.5	3.0	.0	24	18
27	4.0	5.2	4.0	.0	21	15
28	8.5	4.0	15	.0	18	15
29	6.0	4.0	12	.0	18	15
30	4.0	3.0	12	.0	18	15
31	2.0	....	12	....	....	15

NOTE.—Daily discharge determined from two rating curves that are fairly well defined, applicable Mar. 19 to Apr. 15 and Apr. 20 to Oct. 31, respectively.

Monthly discharge of Porcupine Creek at Nashua, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
Mar. 19-31	8.5	1.0	5.3	137	B.
April	83	.5	14.8	881	B.
May	15	1.0	3.48	214	B.
June	9.0	.0	1.95	116	B.
July	.0	.0	.00	0	
August	.0	.0	.00	0	
September	347	.0	89.5	5,330	B.
October	[a] 347	15	53.1	3,260	B.

[a] Maximum crest Oct. 4, 491 second-feet.

NOTE.—Stream dry June 21 to Sept. 5.

PRIVATE CANALS IN MILK RIVER VALLEY.

GENERAL FEATURES.

Since 1905 a number of stations have been maintained on private canals in Milk River valley for the purpose of ascertaining the extent of private water rights. With the exception of Rock Creek Canal, which is near Hinsdale, in Valley County, these canals are located in Chouteau County and are used to irrigate lands in the vicinity of Harlem and Chinook.

The canals are all built on small grades and in soil which is easily eroded. In many of them silt has been deposited, and nearly all of them contain a growth of weeds and moss. At low stages the water is uniformly sluggish. In order to divert water into the laterals checks are erected in the main canals, and these checks often produce back-water effects for long distances above. They were put up under a great variety of conditions, and as a result velocities are found to differ widely at the same gage height during the season. In order to establish the correct relation between gage height and discharge it is necessary to make several rating curves for the same canal station. Frequent discharge measurements are necessary to obtain reliable results. Staff gages are located on all canals and most measurements are made by wading.

PARADISE VALLEY CANAL NEAR CHINOOK, MONT.

Location.—Near the head gate at Rudolph Friede's ranch; reached by driving along the south river road from Chinook.

Records available.—June, 1903, to August 31, 1911.

Discharge measurements.—Made by wading.

Discharge measurements of Paradise Valley canal near Chinook, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 24	J. C. Beebe	1.41	11.2	June 11[a]	J. C. Beebe	1.25	15.9
May 2	do	1.38	12	22	do	0.91	0.5
9	do	1.51	15.7	29	do	1.32	5.0
13	do	1.77	21	July 5	do	1.30	3.0
20	do	1.42	8.6	28	do	1.32	1.8
26	do	1.25	5.3	Aug. 1	do	1.71	7.1

[a] Gage height distorted by changing stage.

Daily gage height, in feet, and discharge, in second-feet, of Paradise Valley canal near Chinook, Mont., for 1911.

[Rudolph Friede, observer.]

Day.	Apr.		May.		June.		July.		Aug.		Sept.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Dis. charge.	Gage height.	Discharge.	Gage height.	Discharge.
1	......	......	1.31	9.3	1.20	4.0	1.44	7.5	1.79	10	......	......
2	......	......	1.31	9.3	1.20	4.0	1.25	3.8	1.66	6.0	......	......
3	......	......	1.50	15	1.18	3.7	1.70	16	1.66	6.0	......	......
4	......	......	1.51	15	1.20	4.0	1.60	12	1.57	3.9	......	......
5	......	......	1.52	16	1.21	4.2	1.26	3.9	1.57	3.9	1.05	......
6	......	......	1.50	15	1.20	4.0	1.41	6.8	1.56	3.7	1.29	......
7	......	......	1.40	12	1.09	2.4	1.42	7.0	1.51	2.7	1.18	......
8	......	......	1.19	6.9	1.21	4.2	1.08	1.3	1.59	4.3	0.79	......
9	......	......	1.50	15	1.26	5.2	0.64	.0	1.58	4.1	0.52	......
10	......	......	1.60	18	1.21	4.2	1.58	11	1.49	2.4	0.42	......
11	......	......	1.58	13	1.25	5.0	1.82	21	1.33	.8	0.34	......
12	......	......	1.49	11	1.57	13	1.72	17	1.19	0	0.31	......
13	......	......	1.81	22	1.50	11	1.68	15	1.29	.4	0.30	......
14	......	......	1.63	15	1.51	11	1.88	19	1.13	0	0.28	......
15	......	......	1.72	19	1.36	7.2	1.72	12	1.15	0	0.26	......
16	......	......	1.72	19	1.52	12	1.76	13	1.15	0	0.24	......
17	......	......	1.71	18	1.52	12	1.64	9.2	1.12	0	0.24	......
18	......	......	1.65	16	1.74	20	1.70	11	0.50	0	0.22	......
19	......	......	1.74	20	1.52	12	1.76	13	0.43	0	0.20	......
20	......	......	1.92	28	1.34	6.8	1.72	12	0.35	0	......	......
21	......	......	1.38	7.6	0.96	.6	1.62	8.6	0.24	0	......	......
22	......	5	1.45	9.5	0.92	.5	1.83	16	0.22	0	......	......
23	......	11	1.42	8.6	1.17	3.6	1.65	9.5	0.20	0	......	......
24	1.48	14	1.44	9.2	1.63	15	1.56	7.0	......	0	......	......
25	1.50	15	1.27	5.4	1.70	18	1.56	7.0	......	0	......	......
26	1.51	15	1.26	5.2	1.61	12	1.73	12	......	0	......	......
27	1.50	15	1.22	4.4	2.04	32	1.58	7.5	......	0	......	......
28	1.71	22	1.25	5.0	1.63	13	1.35	2.5	......	0	......	......
29	1.72	23	1.24	4.8	1.85	22	1.45	4.5	......	0	......	......
30	1.59	18	1.21	4.2	1.61	12	1.53	6.2	......	0	......	......
31	......	......	1.21	4.2	......	......	1.69	11	......	0	......	......

NOTE.—Daily discharge determined from a series of parallel curves. Discharge estimated Apr. 22 and 23.

Monthly discharge of Paradise Valley canal near Chinook, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April 22-30	23	5	15.3	273
May	28	4.2	12.3	756
June	32	.5	9.29	553
July	21	.0	9.78	601
August	10	.0	1.55	95.3
The year				2,280

NOTE.—Canal head gates open Apr. 22 and closed Aug. 14. No flow Jan. 1 to Apr. 21 and Aug. 15 to Dec. 31.

COOK CANAL NEAR CHINOOK, MONT.

Location.—About half a mile above a small wooden highway bridge on the road running parallel to the Great Northern Railway, about 3 miles east of Chinook.

Records available.—April 10, 1905, to July 31, 1911.

Gage.—Staff.

Discharge measurements.—Made from highway bridge.

Discharge measurements of Cook canal near Chinook, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 12	John C. Beebe	2.19	23	May 26	John C. Beebe	3.98	35
23	do	3.97	51	June 11	do	3.16	12.8
May 2	do	3.89	39	22	do	2.17	2.8
9	do	2.16	1.3	29	do	2.43	3.4
13	do	3.88	42	July 5	do	1.75	.0
20	do	3.83	30				

Daily gage height, in feet, and discharge, in second-feet, of Cook canal near Chinook, Mont., for 1911.

[Adam Jamison, observer.]

Day.	April.		May.		June.		July.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			3.75	34	3.93	37	1.95	1.0
2			3.95	46	3.92	38	1.97	1.0
3			4.05	54	3.95	40	1.91	.8
4			3.88	42	3.92	38	1.83	.4
5			3.82	38	3.89	38	1.75	.2
6			3.90	43	3.75	30	1.65	.0
7			2.18	2.1	3.65	26	1.55	.0
8			2.15	2.0	3.50	22	1.50	.0
9			2.15	2.0	3.40	20	1.59	.0
10			2.20	2.2	3.30	17	2.00	1.2
11			2.13	1.8	3.20	15	2.45	3.8
12			3.98	49	3.00	11	2.43	3.6
13			3.88	42	2.95	10	2.29	2.7
14			3.95	44	2.85	8.8	2.15	2.0
15			3.95	42	2.75	7.2	2.01	1.2
16			3.85	35	2.62	5.8	1.81	.3
17			3.85	33	2.50	4.3	1.62	.0
18			3.85	32	2.35	3.1	1.55	.0
19			3.78	28	2.30	2.8	1.72	.1
20			3.72	25	2.25	2.5	1.70	.0
21			3.70	24	2.21	2.3	1.65	.0
22			3.65	22	2.23	2.4	1.50	.0
23	3.98	49	3.65	22	2.90	9.5	1.45	.0
24	4.00	50	3.85	30	2.20	2.2	1.30	.0
25	3.93	45	3.90	32	2.45	3.8	1.31	.0
26	3.85	40	3.95	34	2.52	4.5	1.25	.0
27	3.83	39	3.98	38	2.80	8.0	1.32	.0
28	4.02	52	3.98	38	2.78	7.7		
29	3.73	34	3.97	37	2.30	2.8		
30	3.75	34	4.07	47	2.09	1.6		
31			4.00	41				

NOTE.—Daily discharge determined from a series of parallel curves and the indirect method for shifting channels.

Monthly discharge of Cook canal near Chinook, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 30-31				[a] 15
April			[b] 42.9	[a] 1,900
May	54	1.8	31.0	1,910
June	40	1.6	14.0	833
July	3.8	0	.59	36
The year				4,690

[a] Estimated by ditch rider as follows: Mar. 30-31, 15 acre-feet. Apr. 1 to 22, 1,220 acre-feet.
[b] Mean Apr. 23 to 30.

NOTE.—Canal gates opened April 23 and closed July 17.

MATHESON CANAL NEAR CHINOOK, MONT.

Location.—At a footbridge 200 feet below the headgate of the canal near the main road, 3½ miles east of Chinook.

Records available.—April 10, 1905, to July 31, 1911.

Gage.—Staff.

Discharge measurements.—Made from footbridge or by wading.

Discharge measurements of Matheson canal near Chinook, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 12	J. C. Beebe	([a])	8.7	May 20	J. C. Beebe	3.10	2.71
14	do	3.6	9.3	26	do	2.90	3.8
May 2	do	3.19	5.9	June 11	do	2.70	[b] 1.3
9	do	3.42	7.1	22	do	2.29	[b] .5
13	do	3.00	4.5	28	do	2.32	1.8

[a] No gage.

[b] Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Matheson canal near Chinook, Mont., for 1911.

[Adam Jamison, observer.]

Day.	April.		May.		June.		July.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage. height.	Discharge.
1			3.35	7.2	3.15	5.6	2.30	1.7
2			3.15	5.6	3.12	5.4	2.25	1.5
3			3.25	6.4	3.10	5.2	2.21	1.3
4			3.25	6.4	3.15	5.6	2.15	1.2
5			3.18	5.8	3.13	5.4	2.21	1.3
6			3.15	5.6	3.09	5.1	2.25	1.5
7			3.50	7.8	3.11	5.3	2.21	1.3
8			3.48	7.6	2.93	4.0	2.19	1.3
9			3.42	7.2	2.95	4.2	2.15	1.2
10			3.47	7.6	2.70	2.5	2.20	1.3
11			3.45	7.4	2.65	2.2	2.51	2.6
12			3.20	6.0	2.71	2.6	2.50	2.6
13			3.01	4.6	2.48	1.2	2.39	2.1
14			2.95	4.2	2.40	.9	2.32	1.8
15			2.59	.9	2.31	.6	2.29	1.7
16			2.42	1.0	2.30	.6	2.30	1.7
17			3.32	4.4	2.30	.6	2.25	1.5
18			3.20	3.4	2.30	.6	2.20	1.3
19			3.15	3.0	2.30	.6	2.15	1.2
20			3.12	2.8	2.30	.6	2.25	1.5
21			2.95	1.7	2.20	.3	2.13	1.1
22			2.95	1.7	2.29	.6	2.15	1.2
23	3.65	9.8	2.89	3.7	2.21	.3	2.23	1.4
24	3.67	9.9	2.80	3.1	2.25	.4	2.30	1.7
25	3.50	8.4	2.75	2.8	2.25	.4	2.21	1.3
26	3.60	9.3	2.85	3.4	2.22	1.4	2.20	1.3
27	3.52	10.0	3.15	5.6	2.21	1.3		0
28	3.48	8.2	3.15	5.6	2.30	1.7		0
29	3.45	8.0	3.10	5.2	2.30	1.7		0
30	3.40	7.6	3.20	6.0	2.32	1.8		0
31			3.20	6.0				0

NOTE.—Daily discharge determinted from a series of parallel curves.

Monthly discharge of Matheson canal near Chinook, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 27-31				[a] 30
April			[b] 8.9	[a] 491
May	7.8	0.9	4.83	297
June	5.6	.3	2.29	136
July	2.6	.0	1.28	78.7

[a] Estimated by ditch rider as follows: Mar. 27-31, 30 acre-feet; Apr. 1-22, 350 acre-feet.
[b] Mean Apr. 23-30.

HARLEM CANAL NEAR ZURICH, MONT.

Location.—About 500 feet below the headgates of the canal, 1½ miles southeast of the Great Northern Railway section house at Zurich; reached by driving from Chinook.

Gage.—Staff.

Discharge measurements.—Made by wading.

Discharge measurements of Harlem canal near Zurich, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 12	J. C. Beebe	2.12	24	June 11	J. C. Beebe	1.61	33
24	do	3.79	67	22	do	2.79	33
May 2	do	3.85	70	29	do	3.31	50
9	do	3.70	69	July 5	do	3.14	40
13	do	3.94	82	8	do	1.78	5.2
20	do	3.90	72	Aug. 1	do	1.08	2.9
26	do	2.65	28				

Daily gage height, in feet, and discharge, in second-feet, of Harlem canal near Zurich, Mont., for 1911.

[Joel Lean, observer.]

Day.	March.		April.		May.		June.		July.		August.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			3.80	78	3.85	70	2.98	38	3.64	60	1.14	3
2			3.60	70	3.90	72		38	3.70	62	1.15	3
3			3.00	49	3.90	72		39	3.64	58	1.11	3
4			2.70	40	3.90	72	3.00	39	3.60	56	1.11	3
5			2.00	22	3.80	70	3.00	43	3.14	40	1.10	3
6			2.00	22	3.80	70	2.95	41	3.10	37	1.05	3
7			3.60	70	3.85	71	3.00	43	1.00	0	1.06	3
8			3.60	70	3.80	73	2.95	41	1.00	0	1.20	4
9			3.80	78	3.70	68	2.70	36	2.70	25	1.30	5
10			3.75	76	3.80	73	2.70	36	3.11	37	1.30	5
11			3.70	74	3.80	73	2.65	34	3.20	40	1.35	5
12			3.70	74	3.80	73	2.65	30	3.20	38	1.42	6
13			3.60	70	3.94	82	2.65	30	3.04	32	1.45	6
14			3.40	56	3.85	79	3.05	42	2.47	19	1.43	6
15			3.35	61	3.86	79	3.00	40	2.25	14	1.35	5
16			3.75	73	3.90	77	3.00	40	2.10	12	1.34	5
17			3.80	75	3.80	73	2.95	38	2.13	14	1.32	5
18			3.80	75	3.80	68	3.20	47	2.15	14	1.30	5
19	1.50	13	3.75	73	3.80	68	3.25	48	2.18	15	1.29	5
20	2.50	34	3.80	72	3.89	72	3.15	45	2.20	15	1.20	4
21	2.70	39	3.80	72	3.75	66	2.95	38	2.20	15	1.20	4
22	2.80	42	3.85	74	3.70	64	2.79	34	2.19	17	1.20	4
23	2.80	42	3.80	72	3.68	64	2.75	32	2.19	17		
24	2.90	46	3.80	69	3.60	61	3.00	40	2.20	17		
25	3.40	63	3.80	69	3.55	59	3.10	43	2.18	16		
26	3.40	63	3.85	71	2.65	30	3.60	61	2.00	13		
27	3.50	67	3.90	73	2.55	27	3.50	57	1.50	7		
28	3.70	74	3.90	72	2.60	31	3.46	56	1.29	5		
29	3.70	74	3.80	68	2.60	31	3.31	50	1.28	5		
30	3.80	78	3.85	70	2.60	31	3.55	59	1.25	4		
31	3.80	78			3.00	40			1.20	4		

NOTE.—Daily discharge determined from a series of parallel curves.

Monthly discharge of Harlem canal near Zurich, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 19-31	78	13	54.8	1,410
April	78	22	66.3	3,950
May	82	27	63.2	3,890
June	61	30	41.9	2,490
July	62	0	22.8	1,400
August 1-22	6	3	4.3	188
The year				13,300

NOTE.—Canal headgates opened Mar. 19 and closed on Aug. 22. No flow for periods Jan. 1 to Mar. 18 and Aug. 23 to Dec. 31.

AGENCY DITCH NEAR HARLEM, MONT.

Location.—At the highway bridge about one-fourth mile below the headgate of the ditch, reached by driving southward from Harlem, Mont.

Records available.—July 14, 1905, to July 31, 1911.

Gage.—Staff.

Discharge measurements.—Made by wading.

Discharge measurements of Agency ditch near Harlem, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 13	J. C. Beebe	3.59	76	June 27	J. C. Beebe	4.12	56
26	do	3.21	74	July 3	do	4.10	83
May 5	do		[a] 0.4	28	do	0.55	.8
June 22	do	3.98	49				

[a] Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Agency ditch near Harlem, Mont., for 1911.

[J. E. Stevens, observer.]

Day.	April.		May.		June.		July.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1				0		0	4.20	77
2				0		0	4.20	81
3				0		0	4.08	82
4				0		0	4.00	79
5				0		0	3.75	71
6				0		0	3.70	71
7				0		0	3.90	77
8				0		0	3.90	77
9				0		0	3.90	77
10				0		0	3.85	78
11				0		0	3.64	71
12				0		0	3.60	70
13	3.59			0	3.85	67	3.52	67
14				0	4.08	74	3.80	78
15				0	4.09	70	3.50	68
16				0	3.95	66	3.40	65
17				0	3.80	61	3.30	62
18				0	3.80	57	3.46	69
19				0	3.90	60	2.70	45
20				0	4.00	60		
21				0	4.20	62		
22				0	4.20	62		
23				0	3.95	48		
24				0	3.90	46		
25				0	3.92	47		
26	3.21	74		0	3.94	50		
27	3.23	75		0	4.20	59		
28	3.24	75		0	4.40	70	0.55	
29	3.31	73		0	4.80	89		
30	3.43	77		0	4.50	82		
31				0				

NOTE.—Daily discharge determined by the indirect method for shifting channels.

Monthly discharge of Agency ditch near Harlem, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 26-31				238
April			75.0	4,460
May	0	0	.0	0
June	89	0	37.7	2,240
July	82		44.4	2,730

NOTE.—Discharge estimated, Apr. 1 to 25, as 75 second-feet, and as 1 second-foot per day July 20 to 31, on account of leakage through gates. Canal gates opened Mar. 26 and closed July 19.

FORT BELKNAP CANAL NEAR CHINOOK, MONT.

Location.—At the highway bridge about 500 feet below the head gates of the canal, 8 miles west of Chinook.

Records available.—June 21, 1903, to September 30, 1911.

Gages.—The high water of June, 1908, washed out both the bridge and the gage; a new gage was installed June 27, 1908, at a different datum within a few feet of the site of the old gage; a new bridge was built about one-fourth mile upstream from the site of the old one.

Discharge measurements.—Made by wading at a section about 300 feet below the gage.

Discharge measurements of Fort Belknap canal near Chinook, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 11	W. A. Lamb	2.14	50	June 20	J. C. Beebe	2.43	69
22	J. C. Beebe	2.96	104	26	.....do	2.20	55
May 1	.....do	3.00	110	29	.....do	1.56	26
8	.....do	2.86	97	July 8	.....do	1.87	33
12	.....do	2.71	94	27	.....do	2.23	48
22	.....do	2.16	51	Aug. 1	.....do	2.08	44
27	.....do	2.11	45	31	R. Richards	1.66	26
June 12	.....do	1.74	32				

Daily gage height, in feet, and discharge, in second-feet, of Fort Belknap canal near Chinook, Mont., for 1911.

[C. W. Hansen, observer.]

Day.	April.		May.		June.		July.		August.		September.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	......	......	3.00	110	2.21	51	......	28	2.00	43	1.15	16
2	......	......	3.00	110	2.21	51	......	29	2.13	50	1.50	21
3	......	......	3.00	110	2.22	51	......	30	2.15	50	1.30	17
4	......	......	3.00	110	2.22	51	......	31	2.10	48	1.30	17
5	......	......	3.00	110	2.22	51	......	32	2.02	44	0.40	8
6	......	......	2.70	86	2.00	43	......	33	2.00	43	0.30	5
7	......	......	2.70	86	2.00	43	1.86	33	2.00	43	0.30	2
8	......	......	2.86	99	2.00	43	2.06	42	2.00	43	0.20	0
9	......	......	3.00	110	2.00	43	2.18	49	2.02	44	0.00	......
10	......	......	3.00	110	......	38	2.30	56	1.90	38	......	......
11	......	......	3.00	116	......	34	2.28	55	2.00	43	......	......
12	......	......	2.71	95	1.70	30	2.28	55	1.70	30	......	......
13	......	......	2.70	94	1.70	30	2.23	52	1.80	34	......	......
14	......	......	2.70	94	1.70	30	2.18	49	1.80	34	......	......
15	......	......	2.70	94	1.60	27	2.26	54	1.78	30	......	......
16	......	......	3.00	116	1.60	27	2.38	61	1.77	30	......	......
17	......	......	3.00	116	2.00	43	2.46	66	1.50	21	......	......
18	......	......	3.00	110	2.00	43	2.40	58	1.80	31	......	......
19	......	......	2.70	86	2.40	65	2.41	59	1.65	26	......	......
20	......	......	2.70	86	2.40	65	2.38	57	1.70	27	......	......
21	2.97	158	2.80	94	2.50	72	2.40	58	1.70	27	......	......
22	2.97	158	2.16	51	2.50	72	2.36	56	1.78	30	......	......
23	2.97	158	2.56	76	2.60	79	2.30	52	1.84	33	......	......
24	2.80	94	2.56	76	2.62	80	2.34	54	1.90	35	......	......
25	2.70	86	2.66	80	2.62	80	2.34	54	1.87	34	......	......
26	2.60	79	2.66	80	2.00	43	2.28	51	1.88	34	......	......
27	2.80	94	2.11	45	2.10	48	2.24	48	1.90	35	......	......
28	2.70	86	2.11	45	1.70	30	2.22	47	1.70	27	......	......
29	2.60	79	2.11	45	1.70	30	2.18	45	1.20	16	......	......
30	2.80	94	2.11	45	1.60	27	2.10	48	1.21	16	......	......
31	......	......	2.21	51	......	......	2.04	45	1.15	16	......	......

Monthly discharge of Fort Belknap canal near Chinook, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 25-31	....	....	....	[a] 450
April	....	....	[b] 109	[b] 4,250
May	116	45	88.3	5,430
June	80	27	47.3	2,810
July	66	28	48.0	2,950
August	50	16	34.0	2,090
September	21	0	2.9	171
The year	....	....	....	18,200

[a] Estimated.

[b] Mean given is mean from Apr. 21 to 30. Flow, Apr. 1 to 20, estimated 2,090 acre-feet.

NOTE.—Canal opened Mar. 25 and closed Sept. 8. No flow Jan. 1 to Mar. 24 and Sept. 8 to Dec. 31.

LITTLE PORCUPINE CREEK BASIN.

LITTLE PORCUPINE CREEK NEAR FRAZER, MONT.

Location.—In S. E. ¼ N. E. ¼ sec. 28, T. 27 N., R. 44 E., above the intake of the reservoir, about 1½ miles above the site of the station maintained from 1908 to 1910 and about one-half mile north of Frazer.

Records available.—July 13, 1908, to September 30, 1910, at the original station; April 14, 1911, to October 31, 1911, at present site.

Drainage area.—Not measured.

Gage.—Staff; and about 2 miles farther upstream than that originally used.

Channel.—Shifting. On the date on which the station was reestablished in 1911 the channel was dry at the new gage but the stream was discharging 0.3 second-feet at the old gage, the water coming from springs near the gage. The channel was dry or water standing in pools until September 6.

Discharge measurements.—Made by wading.

Discharge measurements of Little Porcupine Creek near Frazer, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 19	John C. Beebe	2.97	0.73
May 16	.....do	2.80	[a]0.1
Oct. 6	W. A. Lamb	3.98	40

[a] Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Little Porcupine creek near Frazer, Mont., for 1911.

[Dan Martin, observer.]

Day.	September.		October.		Day.	September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
1		0	3.25	7.0	16	5.2	122	3.45	14
2		0	3.15	4.1	17	4.1	47	3.45	14
3		0	3.20	5.4	18	3.8	30	3.40	12
4		0	3.20	5.4	19	3.6	20	3.35	10
5		0	3.40	12	20	3.30	8.5	3.25	7.0
6	3.35	10	3.90	35	21	3.30	8.5	3.30	8.5
7	5.1	115	3.60	20	22	3.30	8.5	3.30	8.5
8	6.1	195	3.50	16	23	3.30	8.5	3.30	8.5
9	5.3	129	3.45	14	24	3.30	8.5	3.30	8.5
10	4.3	59	3.40	12	25	3.30	8.5	3.30	8.5
11	4.4	66	3.45	14	26	3.30	8.5	3.30	8.5
12	3.8	30	3.65	22	27	3.30	8.5	3.30	8.5
13	3.30	8.5	3.45	14	28	3.30	8.5	3.30	8.5
14	3.30	8.5	3.40	12	29	3.30	8.5	3.30	8.5
15	3.30	8.5	3.60	20	30	3.30	8.5	3.30	8.5
					31			3.30	8.5

NOTE.—Daily discharge determined from a poorly defined rating curve.

Monthly discharge of Little Porcupine Creek near Frazer, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
September	195	0	31.4	1,870	C.
October	35	4.1	11.7	719	B.

WOLF CREEK BASIN.

WOLF CREEK NEAR WOLF POINT, MONT.

Location.—In the SE. ¼ SW. ¼ sec. 8, T. 27 N., R. 47 E., at William Smith's ranch, 2½ miles northwest of Wolf Point, Mont.

Records available.—August 15, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—A staff near the house of the observer.

Channel.—Shifting.

Discharge measurements.—Made by wading near the gage.

Diversions.—A small irrigation ditch diverts water above the gage.

Discharge measurements of Wolf Creek near Wolf Point, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 18	J. C. Beebe	2.04	8.2	May 17	J. C. Beebe	1.83	1.9
18	do	2.04	8.1	June 15	do	1.81	.6
May 17	do	1.83	1.8	Oct. 8	W. A. Lamb	2.20	7.2

Daily gage height, in feet, of Wolf Creek near Wolf Point, Mont., for 1911.

[W. H. Smith, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2.05	2.05	2.25	2.45	1.4	1.45	2.25	2.25
2	....	2.05	2.05	2.2	2.4	1.45	1.45	2.25	2.2
3	....	2.0	2.0	2.25	2.25	1.4	3.5	2.2	2.25
4	....	2.05	2.05	2.2	2.2	1.45	3.55	2.05	2.2
5	....	2.0	2.0	2.25	2.25	1.45	3.5	2.0	2.25
6	....	2.05	2.05	2.25	2.25	1.2	3.55	2.05	2.25
7	....	2.05	1.85	2.2	2.2	1.25	3.55	2.05	2.2
8	....	2.0	1.8	2.25	2.25	1.2	3.5	2.2	2.25
9	....	2.05	1.85	2.2	2.2	1.25	3.55	2.25	2.2
10	....	2.0	1.8	2.25	2.25	1.25	3.8	2.2	2.25
11	....	2.05	1.85	1.85	2.05	1.2	3.85	2.25	2.25
12	....	2.05	1.85	1.8	2.0	1.25	3.85	2.25	....
13	....	2.0	1.8	1.85	1.65	1.2	3.8	2.2	....
14	....	2.05	1.85	1.8	1.6	1.25	3.85	2.25	....
15	....	2.0	1.8	1.85	1.65	1.25	3.8	2.2	....
16	....	2.05	1.85	1.85	1.65	1.2	3.85	2.25	....
17	....	2.05	1.85	1.8	1.6	1.25	3.65	2.25	....
18	....	2.0	1.8	1.85	1.65	1.2	3.6	2.2	....
19	4.4	2.05	1.85	1.8	1.6	1.25	3.65	2.25	....
20	4.45	2.0	1.8	1.85	1.65	1.45	2.2	2.2	....
21	4.4	2.05	1.85	2.45	1.65	1.4	2.25	2.25	....
22	4.45	2.05	1.85	2.4	1.6	1.45	2.25	2.25	....
23	4.45	2.0	1.8	2.45	1.45	1.4	2.2	2.2	....
24	4.2	2.05	2.25	2.4	1.4	1.45	2.25	2.25	....
25	4.25	2.0	2.2	2.45	1.45	1.45	2.2	2.2	....
26	4.0	2.05	2.25	2.45	1.45	1.4	2.25	2.25	....
27	4.05	2.05	2.25	2.2	1.4	1.45	2.25	2.25	....
28	3.05	2.0	2.2	2.25	1.45	1.4	2.2	2.2	....
29	3.0	2.05	2.25	2.2	1.4	1.45	2.25	2.25	....
30	3.05	2.0	2.2	2.25	1.45	1.45	2.2	2.2	....
31	2.05	....	2.25	....	1.45	1.4	....	2.25	....

Daily discharge, in second-feet, of Wolf Creek near Wolf Point, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		8.5	6.0	8.0	14	0.2	0.2	8.0	8.0
2		8.5	6.0	7.0	12	.2	.2	8.0	7.0
3		7.5	5.5	8.0	8.0	.2	79	7.0	8.0
4		8.5	6.0	7.0	7.0	.2	83	4.2	7.0
5		7.5	5.5	8.0	8.0	.2	79	3.5	8.0
6		8.5	6.0	8.0	8.0	.0	88	4.2	8.0
7		8.5	3.5	7.0	7.0	.0	83	4.2	7.0
8		7.5	3.0	8.0	8.0	.0	79	7.0	8.0
9		8.5	3.5	7.0	7.0	.0	88	8.0	7.0
10		7.5	3.0	8.0	8.0	.0	103	7.0	8.0
11		8.5	2.5	1.6	4.2	.0	107	8.0	8.0
12		8.5	2.5	1.3	3.5	.0	107	8.0	
13		7.5	2.0	1.6	.6	.0	103	7.0	
14		8.5	2.5	1.3	.5	.0	107	8.0	
15		7.5	2.0	1.6	.6	.0	103	7.0	
16		8.5	2.5	1.6	.6	.0	107	8.0	
17		8.5	2.5	1.3	.5	.0	98	8.0	
18		7.5	1.3	1.6	.6	.0	87	7.0	
19	150	8.0	1.6	1.3	.5	.0	93	8.0	
20	154	7.0	1.3	1.6	.6	.2	7.0	7.0	
21	150	8.0	1.6	14	.6	.2	8.0	8.0	
22	154	8.0	1.6	12	.5	.2	8.0	8.0	
23	154	7.0	1.3	14	.2	.2	7.0	7.0	
24	134	7.0	8.0	12	.2	.2	8.0	8.0	
25	138	6.5	7.0	14	.2	.2	7.0	7.0	
26	119	7.0	8.0	14	.2	.2	8.0	8.0	
27	122	7.0	8.0	7.0	.2	.2	8.0	8.0	
28	52	6.5	7.0	8.0	.2	.2	7.0	7.0	
29	49	6.0	8.0	7.0	.2	.2	8.0	8.0	
30	52	5.5	7.0	8.0	.2	.2	7.0	7.0	
31	8.5		8.0		.2	.2		8.0	

NOTE.—Daily discharge determined as follows: Mar. 19 to Apr. 18, from a curve poorly defined; Apr. 19 to May 17, by indirect method for shifting channels; May 18 to Nov. 11, from curve well defined.

Monthly discharge of Wolf Creek near Wolf Point, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	0.0	0.0	0.00	0	
February	.0	.0	.0	0	
March	154		60.9	3,740	D.
April	8.5	5.5	7.65	455	C.
May	8.0	1.3	4.33	266	C.
June	14	1.3	6.66	396	B.
July	14	.2	3.29	202	B.
August	.2	.0	.11	6.8	B.
September	107	.2	55.4	3,300	B.
October	8.0	3.5	7.13	438	B.
November			5.97	355	
December			2.00	123	
The year	154	0	12.8	9,280	

NOTE.—Means for January, February, and December, estimated; mean forperiod Mar. 1 to 18, estimated at 25 second-feet; mean for period Nov. 12 to 30, estimated, at 5 second-feet.

POPLAR RIVER BASIN.

POPLAR RIVER NEAR POPLAR, MONT.

Location.—At the United States reclamation camp in the SW¼ SE. ¼ sec. 5, T. 21 N., R. 51 E., 12 miles upstream from the station formerly maintained at Buershia's ranch, 6 miles north of Poplar, Mont.

Records available.—August 15, 1908, to June 30, 1911, at old site; May 2, 1911, to September 30, 1911, at present site.

Drainage area.—Not measured.

Gage.—Staff on right bank; datum unchanged at the present station.

Channel.—Shifts.

Discharge measurements.—Made by wading.

Winter flow.—Ice present.

Discharge measurements of Poplar River near Poplar, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 16	J. C. Beebe	3.85	234	June 15	J. C. Beebe	2.95	65
16	.....do	4.01	284	30	.....do	2.57	21
May 15	.....do	2.66	31	30[a]	.....do	3.72	22
15	.....do	2.67	36	Oct. 9[a]	W. A. Lamb	4.55	147
June 15	.....do	2.95	64				

[a] Measurements at new station.

Daily gage height, in feet, and discharge, in second-feet, of Poplar River near Poplar, Mont., for 1911.

[Louis Obershaw, observer.]

Day.	April.		May.		June.		Day.	April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			3.35	136	3.15	99	16			2.85	52	2.95	66
2			3.35	136	3.25	117	17			2.75	40		62
3			3.25	117	4.15	308	18			2.85	52		58
4			3.25	117	4.35	358	19			2.85	52		54
5			3.25	117	3.45	155	20			2.85	52		52
6			3.15	99	3.35	136	21			2.75	40		48
7			3.05	82	3.35	136	22			2.65	30		46
8			2.85	52	3.35	136	23	3.75	215	2.55	22		44
9			2.85	52	3.25	117	24	3.85	235	2.55	22		42
10			2.85	52	3.25	117	25	3.65	195	2.55	22	2.75	40
11			2.75	40	3.25	117	26	3.65	195	2.55	22	2.75	40
12			2.75	40	3.15	99	27	3.55	175	2.85	52	2.65	30
13			2.75	40	3.05	82	28	3.45	155	3.15	99	2.65	30
14			2.85	52	3.05	82	29	3.45	155	3.15	99	2.65	30
15			2.75	40	2.95	66	30	3.35	136	3.15	99	2.65	30
							31			3.15	99		

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge interpolated June 17 to 24.

Monthly discharge of Poplar River near Poplar, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April 23-30	235	136	183	2,900
May	136	22	65.7	4,040
June	358	30	93.2	5,550

Daily gage height, in feet, and discharge, in second-feet, of Poplar River at United States Reclamation Service camp near Poplar, Mont., for 1911.

[B. M. Conner, observer.]

Day.	May.		June.		July.		August.		September.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	....	126	4.30	99	4.00	52	3.70	21	3.70	21
2	4.45	126	4.40	117	4.00	52	3.70	21	3.65	17
3	4.35	108	4.9	215	4.50	136	3.90	40	3.65	17
4	4.35	108	4.6	155	4.30	99	3.90	40	3.65	17
5	4.25	90	4.6	155	4.20	82	4.00	52	3.90	40
6	4.25	90	4.6	155	4.05	59	4.00	52	5.6	390
7	4.20	82	4.5	136	4.00	52	3.95	46	5.9	465
8	4.15	74	4.45	126	4.00	52	3.90	40	5.6	390
9	4.10	66	4.45	126	3.90	40	4.30	99	....	365
10	4.10	66	4.40	117	3.90	40	4.10	66	....	340
11	4.05	59	4.30	99	3.85	35	4.05	59	....	315
12	4.00	52	4.30	99	3.85	35	4.00	52	....	290
13	4.00	52	4.25	90	3.85	35	3.95	46	....	265
14	3.95	46	4.20	82	3.85	35	3.90	40	....	240
15	3.95	46	4.15	74	3.80	30	3.90	40	....	215
16	4.00	52	4.10	66	3.80	30	3.85	35	....	190
17	4.00	52	4.10	66	3.80	30	3.80	30	4.6	155
18	3.95	46	4.05	59	3.75	26	3.80	30	4.6	155
19	3.95	46	4.05	59	3.70	21	3.80	30	4.6	155
20	3.90	40	4.00	52	3.70	21	3.80	30	....	147
21	3.90	40	3.95	46	3.70	21	3.80	30	....	139
22	3.90	40	4.05	59	3.70	21	3.80	30	....	131
23	3.90	40	3.95	46	3.80	30	....	30	....	123
24	3.90	40	3.90	40	3.80	30	....	29	....	115
25	3.90	40	3.90	40	3.75	26	....	28	....	107
26	4.10	66	3.90	40	3.70	21	....	28	....	99
27	4.30	99	3.90	40	3.75	26	....	27	....	91
28	4.25	90	3.85	35	3.75	26	....	27	4.20	82
29	4.25	90	3.85	35	3.75	26	3.75	26	4.15	74
30	4.30	99	3.90	40	3.75	26	3.70	21	4.10	66
31	4.30	99	....	....	3.70	21	3.70	21	....	....

NOTE.—Daily discharge determined from curve based on two measurements and slope data. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Poplar River at United States Reclamation Service camp near Poplar, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	126	40	70.0	4,300	C.
June	215	35	85.6	5,090	C.
July	136	21	39.9	2,450	C.
August	99	21	37.6	2,310	C.
September	465	17	174	10,400	C.

BIG MUDDY CREEK NEAR CULBERTSON, MONT.

Location.—In the SW. ¼ sec. 17, T. 29 N., R. 54 E., at Gustave Sholtz's ranch, 11 miles above the mouth of the stream and 8 miles above the site of the original station, which was discontinued because gage heights were affected by backwater from the Missouri.

Records available.—July 14, 1908, to July 19, 1909, at original station; July 19, 1909, to December 31, 1911, at present station.

Gage.—An inclined rod on left bank of stream near residence of observer; datum unchanged.

Channel.—Mud.

Discharge measurements.—Made by wading.

Winter flow.—Little if any flow during months of January, February, October, November, and December.

Accuracy.—Results at new station are good.

Discharge measurements of Big Muddy Creek near Culbertson, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 17	J. C. Beebe	4.74	162	June 14	J. C. Beebe	3.65	33
17	do	4.77	160	July 27	do	2.89	5.6
May 14	do	2.40	15.7	Oct. 5	W. A. Lamb	2.65	12

Daily gage height, in feet, of Big Muddy Creek near Culbertson, Mont., for 1911.

[Thos. Shields, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		3.45	2.5	2.8	3.75	2.95	3.65	2.5	2.4
2		3.45	2.4	2.8	3.65	2.95	3.55	2.5	2.4
3		4.35	2.4	2.9	3.65	3.15	3.6	2.5	2.4
4		4.7	2.4	2.9	3.65	3.25	3.65	2.6	2.3
5		5.3	2.4	2.9	3.45	3.25	3.65	2.7	2.3
6		5.3	2.4	2.9	3.45	3.45	3.7	2.95	2.3
7		5.8	2.5	3.35	3.45	3.35	3.65	3.05	2.3
8		4.8	2.5	3.35	3.35	3.35	3.65	3.35	
9		4.8	2.5	3.45	3.35	3.35	3.55	3.75	
10		4.7	2.5	3.55	3.25	3.35	3.25	4.45	
11		4.6	2.5	3.55	3.25	3.35	3.25	4.55	
12		4.3	2.5	3.65	3.25	3.3	3.15	4.25	
13		4.3	2.5	3.65	3.25	3.25	3.15	3.95	
14		4.5	2.3	3.65	3.25	3.25	3.95	3.45	
15		4.5	2.3	3.65	3.25	3.25	4.35	3.15	
16		4.7	2.3	3.55		3.25	4.45	3.05	
17		4.7	2.3	3.55		3.15	4.25	2.95	
18		4.9	2.3	3.45		3.15	3.95	2.85	
19		4.9	2.3	3.35		3.15	3.75	2.8	
20		4.9	2.3	3.35		3.15	3.55	2.7	
21		4.5	2.3	3.35		3.15	3.35	2.7	
22		4.15	2.3	3.45		3.05	3.15	2.6	
23		2.9	2.3	3.75		2.95	3.05	2.6	
24		2.8	2.3	3.75		2.85	2.95	2.5	
25		2.8	2.4	3.75		3.0	2.85	2.4	
26		2.7	2.5	3.75		2.95	2.8	2.4	
27	3.35	2.6	2.5	3.75	2.89	3.85	2.8	2.4	
28	3.35	2.6	2.5	3.75		3.85	2.7	2.4	
29	3.35	2.6	2.5	3.75		3.75	2.7	2.4	
30	3.35	2.5	2.6	3.75	2.85	3.75		2.4	
31	3.45		2.8		2.9	3.65		2.4	

Daily discharge, in second-feet, of Big Muddy Creek near Culbertson, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		33	8	12	39	6	58	8	6
2		33	8	12	33	6	48	8	6
3		112	8	12	33	12	52	8	6
4		151	8	12	33	18	58	11	4
5		220	8	12	22	18	58	14	4
6		220	8	12	22	28	70	24	4
7		280	14	23	22	24	58	28	4
8		162	14	28	18	24	58	48	
9		162	14	29	18	24	48	83	
10		151	14	34	14	24	28	160	
11		140	14	27	14	24	28	172	
12		107	18	33	14	21	23	136	
13		107	18	33	14	18	23	108	
14		129	14	33	14	18	102	56	
15		129	12	33	14	18	132	34	
16		151	12	27	14	18	144	28	
17		151	12	27	13	15	121	24	
18		173	9	22	13	19	90	19	
19		173	9	18	15	19	82	17	
20		173	9	18	13	19	55	14	
21		129	9	18	10	19	40	14	
22		106	7	22	8	15	28	11	
23		14	7	39	6	12	24	11	
24		12	7	39	6	9	18	8	
25		12	9	39	5	14	16	6	
26		10	8	39	5	12	14	6	
27	27	10	8	39	5	64	14	6	
28	27	10	8	39	5	64	11	6	
29	27	10	8	39	4.5	56	14	6	
30	27	8	8	39	4.5	56	11	6	
31	33		12		5	48		6	

NOTE.—Daily discharge determined from a series of parallel curves and by the indirect method for shifting channels. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Big Muddy Creek near Culbertson, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			0	0	
February			0	0	
March			25.5	1,570	D.
April	280	8	109	6,490	C.
May	18	7	10.4	640	C.
June	39	12	26.8	1,590	C.
July	39	4.5	14.7	904	C.
August	64	6	23.9	1,470	C.
September	144	11	50.9	3,030	C.
October	172	6	34.9	2,150	C.
November			3.4	202	D.
December			0	0	
The year	280	0	24.9	18,000	

NOTE.—Discharge Mar. 1 to 26 estimated at 25 second-feet per day, and Nov. 8 to 30 at 3 second-feet.

YELLOWSTONE RIVER BASIN.

YELLOWSTONE RIVER AT CORWIN SPRINGS, MONT.

Location.—In the NE. ¼ sec. 30, T. 8 S., R. 8 E., in the canyon at Corwin Springs, Mont., 8 miles below Gardiner, the northern entrance to Yellowstone National Park.

Records available.—September 2, 1910, to December 31, 1911.

Drainage area.—2,630 square miles.

Gage.—Staff gage nailed to wooden pier (right bank) on lower side of highway bridge.

Channel.—Bed of stream rocky; free from vegetation.

Discharge measurements.—Made from the lower side of highway bridge.

Diversions.—No water is diverted from the Yellowstone above this station.

Discharge measurements of Yellowstone River at Corwin Springs, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 10	R. Richards	6.31	10,200
Aug. 17	B. E. Jones	3.40	3,450
Oct. 25	.....do	1.69	1,480
26	.....do	1.56	1,400

Daily gage height, in feet, and discharge, in second-feet, of Yellowstone River at Corwin Springs, Mont., for 1910.

[C. H. Wilks, jr., observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	....	1,600	1.4	1,300	1.2	1,160	1.1	1,100
2	1.8	1,620	1.4	1,300	1.2	1,160	1.1	1,100
3	1.7	1,530	1.4	1,300	1.2	1,160	1.1	1,100
4	1.7	1,530	1.5	1,370	1.2	1,160	1.1	1,100
5	1.7	1,530	1.5	1,370	1.1	1,100	1.0	1,040
6	1.7	1.530	1.5	1.370	1.1	1,100	1.1	1,100
7	1.7	1,530	1.4	1,300	1.1	1,100	1.0	1,040
8	1.7	1,530	1.4	1,300	1.1	1,100	1.0	1,040
9	1.6	1,450	1.4	1,300	1.2	1,160	1.0	1,040
10	1.5	1,370	1.4	1,300	1.2	1,160	1.0	1,040
11	1.6	1,450	1.4	1,300	1.2	1,160	1.0	1,040
12	1.6	1,450	1.4	1,300	1.1	1,100	1.0	1,040
13	1.6	1,450	1.5	1,370	1.2	1,160	....	....
14	1.6	1,450	1.4	1,300	1.1	1,100	....	....
15	1.6	1,450	1.4	1,300	1.0	1,040	....	....
16	1.6	1,450	1.4	1,300	1.0	1,040	....	....
17	1.6	1,450	1.4	1,300	1.1	1,100	....	....
18	1.6	1,450	1.4	1,300	1.1	1,100	....	....
19	1.5	1,370	1.4	1,300	1.1	1,100	....	....
20	1.5	1.370	1.3	1,230	1.0	1,040	....	....
21	1.5	1,370	1.3	1,230	1.1	1,100	....	....
22	1.6	1,450	1.3	1,230	1.1	1,100	....	....
23	1.6	1,450	1.3	1,230	1.1	1,100	....	....
24	1.5	1,370	1.3	1,230	1.1	1,100	....	....
25	1.5	1,370	1.3	1,230	1.1	1,100	....	....
26	1.5	1,370	1.3	1,230	1.2	1,160	....	....
27	1.5	1,370	1.2	1,160	1.0	1,040	....	....
28	1.5	1.370	1.2	1,160	1.0	1,040	....	....
29	1.5	1,370	1.2	1,160	1.1	1,100	....	....
30	1.4	1,300	1.2	1,160	1.1	1,100	....	....
31	....	....	1.2	1,160	....	....	....	....

Daily gage height, in feet, of Yellowstone River at Corwin Springs, Mont., for 1911.

[C. H. Wilks, jr., observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	1.4	1.9	6.6	7.8	4.5	2.6	2.0	1.4	1.6
2	....	1.5	1.9	7.2	7.4	4.5	2.6	2.1	1.4	1.3
3	....	1.5	2.0	6.7	7.4	4.4	2.6	2.2	1.4	1.3
4	....	1.5	2.2	7.0	7.5	4.3	2.6	2.1	1.5	1.3
5	....	1.4	2.6	7.4	7.2	4.3	2.6	2.0	1.5	1.3
6	....	1.5	3.8	7.6	7.2	4.2	2.7	2.0	1.5	1.3
7	....	1.6	3.3	7.6	7.2	4.2	2.7	2.0	1.4	1.3
8	0.8	1.4	3.5	8.2	7.2	4.1	2.7	2.0	1.4	1.3
9	.8	1.4	4.2	8.4	7.0	4.0	2.7	1.9	1.4	1.3
10	.8	1.4	3.7	8.0	6.3	3.9	2.6	1.9	1.4	1.3
11	.8	1.4	3.3	8.4	6.2	3.8	2.5	1.9	1.3	1.3
12	.8	1.4	3.2	9.2	6.0	3.8	2.4	1.9	1.2	1.3
13	.8	1.3	3.9	10.2	6.1	3.7	2.4	1.9	1.4	1.2
14	.8	1.2	4.1	9.8	6.0	3.6	2.4	1.9	1.5	1.2
15	.8	1.2	4.7	9.4	5.9	3.5	2.4	2.0	1.6	1.3
16	.9	1.3	4.9	9.4	5.7	3.5	2.4	1.9	1.6	1.3
17	.9	1.4	4.2	9.0	5.6	3.4	2.3	1.9	1.5	1.2
18	1.0	1.4	4.0	9.0	5.6	3.4	2.2	1.8	1.5	1.2
19	1.0	1.5	3.7	9.2	5.4	3.3	2.2	1.8	1.5	1.1
20	1.1	1.5	3.4	9.2	5.4	3.2	2.2	1.7	1.6	1.3
21	1.2	1.6	3.3	9.4	5.3	3.2	2.1	1.7	1.5	1.2
22	1.2	1.7	3.7	9.7	5.2	3.1	2.1	1.7	1.5	1.2
23	1.2	1.6	3.9	9.4	5.1	3.0	2.1	1.7	1.4	1.3
24	1.3	1.6	4.6	9.0	4.9	3.0	2.1	1.7	1.4	1.2
25	1.3	1.6	5.0	8.2	4.8	3.0	2.2	1.7	1.4	1.2
26	1.2	1.7	5.6	7.9	4.7	3.0	2.2	1.6	1.5	1.4
27	1.2	1.9	4.7	7.8	4.9	2.9	2.1	1.6	1.5	1.2
28	1.2	2.0	4.3	8.2	4.8	2.8	2.1	1.6	1.3	1.2
29	1.2	2.0	4.1	7.8	4.7	2.8	2.1	1.5	1.4	....
30	1.3	1.9	4.5	7.8	4.6	2.8	2.0	1.5	1.4	1.4
31	1.4	....	5.4	....	4.7	2.7	....	1.5	....	1.6

Daily discharge, in second-feet, of Yellowstone River at Corwin Springs, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	1,300	1,710	11,100	14,800	5,520	2,410	1,800	1,300	1,450
2	....	1,370	1,710	12,900	13,500	5,520	2,410	1,890	1,300	1,230
3	....	1,370	1,800	11,400	13,500	5,300	2,410	1,990	1,300	1,230
4	....	1,370	1,990	12,300	13,800	5,090	2,410	1,890	1,370	1,230
5	....	1,300	2,410	13,500	12,900	5,090	2,410	1,800	1,370	1,230
6	....	1,370	4,130	14,200	12,900	4,890	2,530	1,800	1,370	1,230
7	....	1,450	3,320	14,200	12,900	4,890	2,530	1,800	1,300	1,230
8	950	1,300	3,630	16,100	12,900	4,690	2,530	1,800	1,300	1,230
9	950	1,300	4,890	16,700	12,300	4,500	2,530	1,710	1,300	1,230
10	950	1,300	3,960	15,400	10,200	4,310	2,410	1,710	1,300	1,230
11	950	1,300	3,320	16,700	9,870	4,130	2,300	1,710	1,230	1,230
12	950	1,300	3,170	19,400	9,300	4,130	2,190	1,710	1,160	1,230
13	950	1,230	4,310	22,800	9,580	3,960	2,190	1,710	1,300	1,160
14	950	1,160	4,690	21,400	9.300	3,790	2,190	1,710	1,370	1,160
15	950	1,160	5,970	20,100	9,030	3,630	2,190	1,800	1,450	1,230
16	990	1,230	6,450	20,100	8.490	3,630	2,190	1,710	1,450	1,230
17	990	1,300	4,890	18,700	8,230	3,470	2,090	1,710	1,370	1,160
18	1,040	1,300	4,500	18,700	8,230	3,470	1,990	1,620	1,370	1,160
19	1,040	1,370	3,960	19,400	7,710	3,320	1,990	1,620	1,370	1,100
20	1,100	1,370	3,470	19,400	7,710	3,170	1,990	1,530	1,450	1,230
21	1,160	1,450	3,320	20,100	7,450	3,170	1,890	1,530	1,370	1,160
22	1,160	1,530	3,960	21,100	7,200	3,030	1,890	1,530	1,370	1,160
23	1,160	1,450	4,310	20,100	6,950	2,900	1,890	1,530	1,300	1,230
24	1,230	1,450	5,740	18,700	6,450	2,900	1,890	1,530	1,300	1,160
25	1,230	1,450	6,700	16,100	6,210	2,900	1,990	1,530	1,300	1,160
26	1,160	1,530	8,230	15,100	5,970	2,900	1,990	1,450	1,370	1,300
27	1,160	1,710	5,970	14,800	6,450	2,770	1,890	1,450	1,370	1,160
28	1,160	1,800	5,090	16,100	6,210	2,650	1,890	1,450	1,230	1,160
29	1,160	1,800	4,690	14,800	5,970	2,650	1,890	1,370	1,300	1,100
30	1,230	1,710	5,520	14,800	5,740	2,650	1,800	1,370	1,300	1,100
31	1,300	....	7,710	....	5,970	2,530	....	1,370	....	1,100

NOTE.—Daily discharge determined from a rating curve that is fairly well defined below 12,300 second-feet.

Monthly discharge of Yellowstone River at Corwin Springs, Mont., for 1910–11.

[Drainage area, 2,630 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1910.							
September	1,620	1,300	1,440	0.548	0.61	85,700	B.
October	1,370	1,160	1,270	.483	.56	78,100	B.
November	1,160	1,040	1,110	.422	.47	66,100	B.
December	1,100		995	.378	.44	61,200	C.
1911.							
January			[a] 900	.342	.39	55,300	
February			[a] 900	.342	.36	50,000	
March	1,300	950	1,050	.399	.46	64,600	B.
April	1,800	1,160	1,400	.532	.59	83,300	B.
May	8,230	1,710	4,370	1.66	1.91	269,000	B.
June	22,800	11,100	16,900	6.43	7.17	1,010,000	C.
July	14,800	5,740	9,280	3.53	4.07	571,000	B.
August	5,520	2,530	3,790	1.44	1.66	233,000	B.
September	2,530	1,800	2,160	.821	.92	129,000	B.
October	1,990	1,370	1,650	.627	.72	101,000	B.
November	1,450	1,160	1,330	.506	.56	79,100	B.
December	1,450	1,100	1,200	.456	.53	73,800	B.
The year			3,740	1.42	19.34	2,720,000	

[a] Estimated.

NOTE.—Means for periods Dec. 13 to 31, 1910, and March 1 to 7, 1911, estimated at 950 second-feet.

YELLOWSTONE RIVER AT HUNTLEY, MONT.

Location.—In the SW. ¼ sec. 24, T. 2 N., R. 27 E., at the new steel highway bridge 1 mile below Huntley, Mont., 1 mile below Pryor Creek. Station replaces that formerly maintained at Junction.

Records available.—October 1, 1907, to December 31, 1911.

Drainage area.—12,000 square miles.

Gage.—Chain fastened to bridge rail; datum unchanged.

Channel.—Shifts.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—River frozen entirely over in places during the winter, but during the coldest seasons open channels with floating ice are not of uncommon occurrence.

Diversions.—The Huntley canal, built by the United States Reclamation Service, takes water from the river about 2 miles above the gaging station; its normal capacity is 400 second-feet, and it supplies the water for 29,000 acres of land. Near Laurel are the headgates of the Billings Land & Irrigation Co.'s canal, which carries about 305 second-feet and irrigates 28,000 acres. Many small ditches take water from the tributaries of the Yellowstone, but few from the stream itself, owing to the variation of the stage of the water surface and consequent difficulty of diversion.

Accuracy.—Conditions for obtaining accurate data at this station are only fair and many discharge measurements are necessary to define a good rating curve.

Discharge measurements of Yellowstone River at Huntley, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 17	W. A. Lamb	5.40	15,800	Aug. 10	B. E. Jones	4.14	9,940
June 15[a]	R. Richards	10.92	47,200	Sept. 11	R. Richards	2.63	5,040
July 25	B. E. Jones	4.62	12,100				

[a] Surface velocities reduced by 0.90.

Daily gage height, in feet, of Yellowstone River at Huntley, Mont., for 1911.

[Arthur Foster, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3	4.2	3.8	2.6	2.8	5.9	7.0	4.4	2.5	2.5	2.15	2.05
2	2.3	4.2	3.8	2.6	2.8	8.2	7.0	4.4	2.5	2.45	2.15	2.0
3	2.4	4.2	3.8	2.6	2.7	9.2	6.9	4.4	2.5	2.4	2.15	2.0
4	2.4	4.2	3.8	2.6	2.8	9.0	6.6	4.3	2.5	2.4	2.15	1.95
5	2.5	4.2	3.8	2.6	2.7	8.8	6.8	4.3	2.4	2.35	2.2	1.9
6	3.3	4.0	3.9	2.6	2.7	9.2	6.8	4.3	2.4	2.35	2.2	1.9
7	3.0	4.0	4.2	2.6	3.6	8.9	6.9	....	2.5	2.3	2.4	1.9
8	3.0	4.0	4.7	2.6	4.0	9.0	7.0	....	2.6	2.3	2.5	1.9
9	2.8	4.0	4.8	2.5	4.0	9.6	6.5	....	2.6	2.3	3.2	1.9
10	2.7	4.0	5.0	2.4	4.0	9.2	6.4	....	2.6	2.25	3.4	1.9
11	2.7	4.0	4.4	2.4	4.4	9.8	6.0	....	2.6	2.25	3.6	1.9
12	2.7	4.2	4.1	2.4	4.0	10.6	5.8	....	2.6	2.20	3.7	1.7
13	2.7	4.3	3.8	2.4	3.9	10.8	5.7	....	2.6	2.20	3.7	1.7
14	2.7	4.0	3.6	2.4	3.8	11.0	5.4	....	2.5	2.20	4.1	1.65
15	2.7	4.0	3.8	2.3	4.4	11.0	5.4	3.5	2.4	2.30	4.5	1.6
16	2.7	3.9	3.6	2.3	5.0	10.6	5.3	3.5	2.4	2.30	4.7	1.6
17	3.0	3.9	3.4	2.4	5.5	10.1	5.2	3.8	....	2.30	5.5	1.6
18	3.1	3.8	3.0	2.3	5.1	9.80	5.2	3.6	....	2.25	5.3	1.6
19	4.2	3.7	2.8	2.4	4.6	9.7	5.3	3.6	....	2.25	5.2	1.6
20	4.0	3.7	2.6	2.4	4.2	10.0	5.2	3.0	....	2.25	4.8	1.6
21	3.1	3.6	2.6	2.4	4.2	10.2	5.1	3.0	....	2.2	4.5	1.6
22	3.5	3.5	2.6	2.4	4.1	9.6	5.1	3.0	....	2.2	4.1	1.6
23	3.5	3.5	2.5	3.1	4.0	9.1	5.0	2.9	....	2.2	3.0	1.6
24	3.7	3.6	2.5	3.0	3.8	8.8	5.0	2.9	....	2.2	2.45	1.6
25	4.2	3.8	2.4	2.8	4.4	8.1	4.7	2.8	....	2.25	2.4	1.6
26	4.2	3.8	2.4	2.6	5.8	7.9	4.4	2.8	....	2.3	2.3	1.6
27	4.2	3.8	2.5	2.7	6.3	7.6	4.4	2.8	....	2.2	2.1	1.6
28	4.2	3.8	2.4	3.10	5.8	7.4	4.4	2.7	....	2.15	2.1	1.9
29	4.2	....	2.5	3.10	5.3	7.1	4.4	2.7	....	2.15	2.1	1.95
30	4.2	....	2.6	3.0	5.1	7.0	4.4	2.7	....	2.1	2.05	2.0
31	4.2	....	2.6	....	5.1	....	4.4	2.6	....	2.1	....	2.0

NOTE.—Gage heights distorted by ice Jan. 1 to Mar. 13 and Nov. 7 to Dec. 31.

Daily discharge, in second-feet, of Yellowstone River at Huntley, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	2,500	4,900	5,500	18,300	24,200	11,000	4,600	4,600	3,640
2	3,000	4,900	5,500	31,200	24,200	11,000	4,600	4,460	3,640
3	3,000	4,900	5,200	37,000	23,700	11,000	4,600	4,320	3,640
4	4,000	4,900	5,500	35,800	22,000	10,600	4,600	4,320	3,640
5	4,000	4,900	5,200	34,600	23,100	10,600	4,320	4,190	3,780
6	5,000	4,900	5,200	37,000	23,100	10,600	4,320	4,190	3,780
7	5,000	4,900	8,000	35,200	23,700	10,000	4,600	4,050	....
8	6,000	4,900	9,400	35,800	24,200	10,000	4,900	4,050	....
9	6,000	4,600	9,400	39,300	21,500	9,000	4,900	4,050	....
10	6,000	4,320	9,400	37,000	21,000	9,000	4,900	3,910	....
11	7,000	4,320	11,000	40,500	18,800	9,000	4,900	3,910	....
12	7,000	4,320	9,400	45,400	17,800	8,000	4,900	3,780	....
13	7,000	4,220	9,050	46,700	17,300	8,000	4,900	3,780	....
14	8,000	4,320	8,700	47,900	15,800	8,000	4,600	3,780	....
15	8,700	4,050	11,000	47,900	15,800	7,650	4,320	4,050	....
16	8,000	4,050	13,800	45,400	15,300	7,650	4,320	4,050	....
17	7,320	4,320	16,300	42,300	14,800	8,700	4,340	4,050	....
18	6,100	4,050	14,300	40,500	14,800	8,000	4,360	3,910	....
19	5,500	4,320	11,900	39,900	15,300	8,000	4,380	3,910	....
20	4,900	4,320	10,200	41,700	14,800	6,100	4,400	3,910	....
21	4,900	4,320	10,200	42,900	14,300	6,100	4,420	3,780	....
22	4,900	4,320	9,800	39,300	14,300	6,100	4,440	3,780	....
23	4,600	6,400	9,400	36,400	13,800	5,800	4,460	3,780	....
24	4,600	6,100	8,700	34,600	13,800	5,800	4,480	3,780	....
25	4,320	5,500	11,000	30,600	12,400	5,500	4,500	3,910	....
26	4,320	4,900	17,800	29,400	11,000	5,500	4,520	4,050	....
27	4,600	5,200	20,400	27,700	11,000	5,500	4,540	3,780	....
28	4,320	6,400	17,800	26,500	11,000	5,200	4,560	3,640	....
29	4,600	6,400	15,300	24,800	11,000	5,200	4,580	3,640	....
30	4,900	6,100	14,300	24,200	11,000	5,200	4,600	3,500	....
31	4,900	....	14,300	....	11,000	4,900	....	3,500	....

NOTE.—Daily discharge determined from a rating curve fairly well defined between 2,000 and 48,000 second-feet. Discharge estimated Mar. 1 to 13, Aug. 7 to 14, and Sept. 17 to 30.

Monthly discharge of Yellowstone River at Huntley, Mont., for 1911.

[Drainage area, 12,000 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a] 2,000	0.167	0.19	123,000	
February			[a] 2,200	.183	.19	122,000	
March	8,700	2,500	5,320	.443	.51	327,000	C.
April	6,400	4,050	4,870	.406	.45	290,000	B.
May	20,400	5,200	10,700	.892	1.03	658,000	B.
June	47,900	18,300	36,500	3.04	3.39	2,170,000	B.
July	24,200	11,000	17,000	1.42	1.64	1,050,000	B.
August	11,000	4,900	7,830	.652	.75	481,000	B.
September	4,900	4,320	4,560	.380	.42	271,000	B.
October	4,600	3,500	3,950	.329	.38	243,000	B.
November	3,780		3,140	.262	.29	187,000	C.
December			[a] 2,300	.192	.22	141,000	
The year	47,900		8,370	.698	9.46	6,060,000	

[a] Estimated.

NOTE.—Mean discharge Nov. 7 to 30 estimated at 3,000 second-feet.

YELLOWSTONE RIVER AT LOWER YELLOWSTONE DAM, AT INTAKE, MONT.

Location.—At the Lower Yellowstone diversion dam, at Intake and 18 miles below Glendive, Mont.

Records available.—Records by War Department and Department of Agriculture, 1893 to 1903; August 1, 1903, to December 31, 1911, by United States Geological Survey. Records January 1 to December 31, 1911, from observations at the present station, which replaces the one formerly maintained at Glendive.

Gage.—A chain gage on the north abutment of the dam. The gage readings show the depth of water on the crest of the dam.

Winter flow.—Affected by ice.

The dam.—The dam, a rock-filled timber-crib structure on a pile foundation, was completed January 29, 1910. It is 700 feet long, crosses the stream at right angles to the current, and will raise the low-water level of the river about 4 feet. The dam is specially designed to resist the destructive effects of ice by having an approach on a slope of 3 to 1, and the downstream face is ogee-shaped and protected by a heavy rock apron.

Diversions.—The Lower Yellowstone canal, which diverts water to irrigate 66,000 acres of land, has its headworks at the north abutment.

Accuracy.—A curve showing relation of gage heights at Glendive and at Lower Yellowstone dam was constructed. Using this curve of relation and discharge measurements made at Glendive, a discharge curve was constructed which is applicable to the gage heights of Lower Yellowstone dam, and should give fair results.

Daily gage height, in feet, of Yellowstone River over Lower Yellowstone dam, at Intake, Mont., for 1911.

[T. F. Hansford, observer.]

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1				1.8	4.6	5.6	3.4	2.3	1.8	1.6
2			1.7	1.85	4.7	5.6	3.3	2.25	1.8	1.6
3			1.7	1.85	5.0	5.4	3.5	2.2	1.9	1.6
4			1.7	1.85	5.5	5.3	3.5	2.15	1.9	1.5
5	0.5		1.7	1.9	5.6	5.2	3.5	2.15	1.9	1.55
6			1.7	1.85	5.6	5.0	3.4	2.6	2.0	1.55
7			1.7	1.85	5.5	4.9	3.4	3.3	1.9	1.55
8		2.8	1.65	1.85	5.7	5.0	3.9	4.1	1.9	
9	1.0	3.0	1.65	1.9	5.8	4.9	4.1	3.7	1.9	
10		3.4	1.65	2.0	6.6	4.9	4.0	3.0	1.9	
11		7.6	1.65	2.2	6.8	4.9	3.9	2.8	1.9	
12	1.3	8.6	1.6	2.4	6.5	4.8	3.5	2.5	1.85	
13		11.6	1.6	2.6	6.3	4.5	3.4	2.3	1.8	
14		4.2	1.6	2.6	6.1	4.2	3.3	2.3	1.8	
15		3.3	1.6	2.7	6.5	4.1	3.1	2.2	1.8	
16	1.5	2.9	1.6	2.8	7.1	4.1	3.0	2.15	1.75	
17		2.8	1.6	2.95	7.4	3.9	2.95	2.1	1.75	
18	1.1	2.6	1.55	3.1	7.7	3.9	2.9	2.0	1.7	
19		2.6	1.5	3.4	7.7	3.8	2.8	2.0	1.7	
20		2.6	1.5	3.8	7.5	3.8	3.0	2.0	1.75	
21	1.4	2.6	1.45	3.5	7.4	3.8	3.0	2.0	1.75	
22		2.5	1.45	3.2	8.0	4.0	2.8	2.0	1.75	
23		2.4	1.5	3.1	7.9	4.0	2.7	2.0	1.7	
24		2.2	1.5	3.0	7.7	3.8	2.6	1.9	1.7	
25	1.7	2.0	1.55	2.8	7.55	3.8	2.5	1.9	1.7	
26		2.0	1.6	3.2	7.3	3.8	2.5	1.85	1.7	
27		1.9	1.75	3.3	6.9	3.6	2.4	1.85	1.7	
28		1.8	1.75	3.4	6.4	3.5	2.4	1.85	1.7	
29	2.0	1.8	1.8	3.8	6.0	3.5	2.4	1.8	1.7	
30		1.8	1.8	4.2	5.8	3.7	2.4	1.8	1.65	
31		1.8		4.4		3.6	2.35		1.65	

NOTE.—Gage heights distorted by ice Jan. 1 to Mar. 15.

Daily discharge, in second-feet, of Yellowstone River over Lower Yellowstone dam, at Intake, Mont., for 1911.

[T. F. Hansford, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		6,490	6,740	29,600	42,200	17,700	9,540	6,740	5,760
2		6,240	7,000	30,800	42,200	16,800	9,240	6,740	5,760
3		6,240	7,000	34,300	39,400	18,600	8,940	7,260	5,760
4		6,240	7,000	40,800	38,100	18,600	8,650	7,260	5,300
5		6,240	7,260	42,200	36,800	18,600	8,650	7,260	5,530
6		6,240	7,000	42,200	34,300	17,700	11,500	7,800	5,530
7		6,240	7,000	40,800	33,100	17,700	16,800	7,260	5,530
8		6,000	7,000	43,600	34,300	22,400	24,400	7,260	
9		6,000	7,260	45,000	33,100	24,400	20,400	7,260	
10		6,000	7,800	56,800	33,100	23,400	14,400	7,260	
11		6,000	8,940	59,800	33,100	22,400	12,900	7,260	
12		5,760	10,200	55,200	32,000	18,600	10,800	7,000	
13		5,760	11,500	52,200	28,600	17,700	9,540	6,740	
14		5,760	11,500	49,400	25,400	16,800	9,540	6,740	
15		5,760	12,200	55,200	24,400	15,200	8,940	6,740	
16	13,600	5,760	12,900	64,400	24,400	14,400	8,650	6,490	
17	12,900	5,760	14,000	69,100	22,400	14,000	8,360	6,490	
18	11,500	5,530	15,200	73,800	22,400	13,600	7,800	6,240	
19	11,500	5,300	17,700	73,800	21,400	12,900	7,800	6,240	
20	11,500	5,300	21,400	70,600	21,400	14,400	7,800	6,490	
21	11,500	5,080	18,600	69,100	21,400	14,400	7,800	6,490	
22	10,800	5,080	16,000	78,400	23,400	12,900	7,800	6,490	
23	10,200	5,300	15,200	76,800	23,400	12,200	7,800	6,240	
24	8,940	5,300	14,400	73,800	21,400	11,500	7,260	6,240	
25	7,800	5,530	12,900	71,400	21,400	10,800	7,260	6,240	
26	7,800	5,760	16,000	67,600	21,400	10,800	7,000	6,240	
27	7,260	6,490	16,800	61,400	19,500	10,200	7,000	6,240	
28	6,740	6,490	17,700	53,800	18,600	10,200	7,000	6,240	
29	6,740	6,740	21,400	47,900	18,600	10,200	6,740	6,240	
30	6,740	6,740	25,400	45,000	20,400	10,200	6,740	6,000	
31	6,740		27,500		19,500	9,850		6,000	

Monthly discharge of Yellowstone River over Yellowstone dam, at Intake, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	....	....	3,500	215,000
February	....	....	4,000	222,000
March	13,600	6,740	9,270	570,000
April	6,740	5,080	5,900	351,000
May	27,500	6,740	12,800	787,000
June	78,400	29,600	55,800	3,320,000
July	42,200	18,600	27,500	1,690,000
August	24,400	9,850	15,500	953,000
September	24,400	6,740	9,900	589,000
October	7,800	6,000	6,680	411,000
November	5,760	....	4,750	283,000
December	....	....	4,000	246,000
The period	78,400	....	13,300	9,640,000

NOTE.—Means for January, February, and December estimated. Daily discharge Mar. 1 to 15 estimated at 9,000 second-feet; discharge Nov. 8 to 30 at 4,500 second-feet.

Daily discharge, in second-feet, of Lower Yellowstone canal at Lower Yellowstone dam, at Intake, Mont., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	148	417	227	43	66	16	175	274	482	95	0	....
2	....	148	417	202	47	66	17	100	185	482	45	30	....
3	....	0	417	195	49	45	18	105	295	482	45	30	....
4	....	0	440	185	50	42	19	105	295	482	45	30	....
5	....	0	440	170	57	42	20	192	295	402	57	43	....
6	....	0	455	155	66	147	21	192	295	295	49	53	....
7	....	180	466	148	66	147	22	192	343	295	49	53	....
8	168	180	466	103	0	99	23	192	353	265	48	53	....
9	168	97	466	103	0	99	24	187	365	265	84	66	....
10	168	97	466	0	0	40	25	184	377	265	74	66	....
11	95	97	468	94	0	....	26	181	313	265	49	66	....
12	95	127	468	95	0	....	27	111	123	265	49	66	....
13	168	210	455	95	0	....	28	111	377	295	49	66	....
14	168	255	468	95	0	....	29	111	353	227	49	66	....
15	168	255	482	95	0	....	30	111	390	235	45	75	....
							31	118	....	227	57	....	....

NOTE.—Estimates of daily discharge of canal furnished by United States Reclamation Service. Canal opened May 8 and closed Oct. 10. No water in canal June 3 to 6, Aug. 10, and Sept. 8 to 16.

Monthly discharge of Lower Yellowstone canal at Lower Yellowstone dam, at Intake, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May 8-31	192	95	146	6,950
June	390	0	214	12,700
July	482	227	388	23,900
August	227	0	92.0	5,660
September	75	0	38.0	2,260
October 1-10	147	40	79.3	1,570
The year	....	....	....	53,000

NORTH FORK OF BIG TIMBER CREEK NEAR BIG TIMBER, MONT.

Location.—In the SE. ¼ SE. ¼ sec. 26, T. 3 N., R. 13 E., 1 mile above the Tintinger ranch, 15 miles northwest of Big Timber, Mont., just above the junction with the South Fork.

Records available.—May 6, 1907, to December 31, 1911.

Drainage area.—40 square miles.

Gage.—Staff on left bank; datum unchanged.

Channel.—Bed composed of bowlders and coarse gravel; probably permanent.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—Several ditches above the station divert water to irrigate approximately 300 acres of land; a large ditch appropriating 50,000 inches of water (including both forks) heads just below the gage. The water rights of Big Timber Creek have never been adjudicated.

Storage.—Two lakes at the head of the North Fork offer excellent reservoir sites. It is proposed to utilize the flow of the North Fork in connection with a project under the Carey Act.

Accuracy.—Results obtained during the open season good.

Discharge measurements of North Fork of Big Timber Creek near Big Timber, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 29	C. S. Heidel	0.91	17.1
May 27	....do	1.63	80
July 18	R. Richards	1.48	67
Aug. 24	C. S. Heidel	1.04	24.5

Daily gage height, in feet, of North Fork of Big Timber Creek near Big Timber, Mont., for 1911.

[N. J. Tintinger, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		0.90	1.00	3.0	1.40	1.05	1.00	0.90	0.95
2		.95	.90	3.1	1.30	1.10	1.05	0.90	0.95
3		.90	.90	2.7	1.30	1.10	1.10	0.85	0.95
4		.90	1.00	3.0	1.20	1.20	1.10	0.85	0.95
5		.90	1.00	2.7	1.30	1.20	1.10	0.85	0.95
6	0.85	.90	1.10	2.40	1.40	1.30	1.10	0.85	0.95
7	.85	.90	1.40	2.00	1.40	1.30	1.05	0.85	0.95
8	.70	.90	1.30	2.00	1.30	1.40	1.05	0.80	0.95
9	.75	.95	1.50	2.10	1.30	1.40	1.00	0.80	0.95
10	.75	1.00	1.40	2.00	1.40	1.45	1.00	0.80	0.95
11	.80	1.00	1.40	2.5	1.40	1.50	1.00	0.80	0.95
12	.85	.95	1.30	2.5	1.40	1.45	1.00	0.80	
13	.85	.90	1.20	3.0	1.30	1.40	1.00	0.80	
14	.80	.85	1.30	2.8	1.40	1.30	1.00	0.80	
15	.85	.85	2.70	2.5	1.40	1.30	1.00	0.80	
16	.80	.85	2.50	2.40	1.40	1.30	1.00	0.80	
17	.85	.85	2.50	2.40	1.40	1.25	.95	0.80	
18	.85	.90	2.40	2.00	1.47	1.25	.95	0.80	
19	.90	.90	2.20	2.00	1.45	1.20	1.00	0.80	
20	.90	.95	1.60	2.40	1.40	1.20	1.00	0.80	
21	.85	.95	1.40	2.40	1.40	1.20	.95	0.80	
22	.85	1.00	1.60	2.30	1.40	1.15	.95	0.80	
23	.90	1.00	1.60	2.20	1.35	1.15	.90	0.80	
24	.90	1.00	1.40	2.15	1.30	1.10	.90	0.80	
25	.90	1.00	1.60	2.00	1.25	1.05	.90	0.85	
26	.85	1.05	1.70	1.85	1.15	1.05	.90	0.85	
27	.85	1.05	1.61	1.70	1.10	1.05	.90	0.90	
28	.85	1.05	1.61	1.70	1.20	1.05	.95	0.90	
29	.91	1.00	1.70	1.65	1.30	1.05	.95	0.90	
30	.91	1.00	1.70	1.45	1.10	1.05	.95	0.95	
31	.90		1.70		1.00	1.00		0.95	

NOTE.—Gage heights distorted by ice Oct. 25 to Nov. 11.

Daily discharge, in second-feet, of North Fork of Big Timber Creek near Big Timber, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	17	22	460	53	25	22	17
2	....	20	17	490	43	28	25	17
3	....	17	17	370	43	28	28	15
4	....	17	22	460	35	35	28	15
5	....	17	22	370	43	35	28	15
6	15	17	28	280	53	43	28	15
7	15	17	53	165	53	43	25	15
8	10	17	43	165	43	53	25	13
9	12	20	65	190	43	53	22	13
10	12	22	53	165	53	59	22	13
11	13	22	53	310	53	65	22	13
12	15	20	43	310	53	59	22	13
13	15	17	35	460	43	53	22	13
14	13	15	43	400	53	43	22	13
15	15	15	370	310	53	43	22	13
16	13	15	310	280	53	43	22	13
17	15	15	310	280	53	39	20	13
18	15	17	280	165	61	39	20	13
19	17	17	220	165	59	35	22	13
20	17	20	80	280	53	35	22	13
21	15	20	53	280	53	35	20	13
22	15	22	80	250	53	32	20	13
23	17	22	80	220	48	32	17	13
24	17	22	53	205	43	28	17	13
25	17	22	80	165	39	25	17	15
26	15	25	97	128	32	25	17	15
27	15	25	82	97	28	25	17	15
28	15	25	82	97	35	25	20	15
29	18	22	97	88	43	25	20	15
30	18	22	97	59	28	25	20	15
31	17	....	97	....	22	22	....	15

NOTE.—Daily discharge determined from a fairly well defined rating curve; discharge estimated Oct. 25 to 31.

Monthly discharge of North Fork of Big Timber Creek near Big Timber, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a]10	615	D.
February	....	....	[a]10	555	D.
March	18	10	15.0	922	C.
April	25	15	19.4	1,150	B.
May	370	17	96.3	5,920	B.
June	490	59	255	15,200	B.
July	61	22	45.8	2,820	B.
August	65	22	37.3	2,290	B.
September	28	17	21.8	1,300	B.
October	17	13	14.0	861	C.
November	....	....	[a]12	714	D.
December	....	....	[a]9	553	D.
The year	490	....	45.4	32,900	

[a] Estimated.

NOTE.—Discharge Mar. 1 to 5 estimated at 15 second-feet per day.

SOUTH FORK OF BIG TIMBER CREEK NEAR BIG TIMBER, MONT.

Location.—In the SE. ¼ SE. ¼ sec. 26, T. 3 N., R. 13 E., 1 mile above Tintinger's ranch, just above the junction with the North Fork, and 15 miles northwest of Big Timber, Mont.

Records available.—May 6, 1907, to December 31, 1911.

Drainage area.—10 square miles.

Gage.—Staff; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made by wading near gage.

Winter flow.—Affected by ice.

Diversions.—A few ditches divert water from the creek, and practically all the water is appropriated.

Accuracy.—Open-season results fairly good.

Discharge measurements of South Fork of Big Timber Creek near Big Timber, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 29	C. S. Heidel	0.51	8.3
May 27	do	.99	50
July 18	R. Richards	.75	31
Aug. 24	C. S. Heidel	.64	15.4

Daily gage height, in feet, of South Fork of Big Timber Creek near Big Timber, Mont., for 1911.

[N. J. Tintinger, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		0.55	0.5	1.5	0.85	0.5	0.6	0.55	0.5
2		.5	.5	1.5	.8	.5	.6	.55	.5
3		.5	.6	1.6	.8	.55	.65	.55	.5
4		.5	.65	1.6	.7	.6	.65	.5	.5
5		.5	.65	1.7	.8	.6	.65	.5	.5
6	0.5	.5	.65	1.6	.85	.65	.65	.5	.5
7	.5	.5	.7	1.5	.85	.8	.6	.5	.5
8	.5	.5	.7	1.4	.8	1.0	.6	.5	.5
9	.5	.5	.75	1.4	.7	.9	.6	.5	.5
10	.55	.55	.7	1.4	.8	.85	.6	.5	.5
11	.5	.55	.65	1.5	.7	.8	.6	.5	.5
12	.5	.5	.6	1.6	.65	.8	.6	.5	
13	.55	.45	.6	1.6	.7	.75	.6	.5	
14	.5	.45	.65	1.6	.7	.75	.6	.5	
15	.5	.45	1.4	1.5	.7	.65	.6	.5	
16	.55	.45	1.0	1.5	.65	.65	.6	.5	
17	.5	.5	.9	1.4	.65	.6	.55	.5	
18	.55	.5	.8	1.0	.75	.6	.55	.5	
19	.65	.5	.7	1.0	.7	.6	.55	.5	
20	.6	.55	.7	1.3	.7	.6	.6	.5	
21	.55	.55	.6	1.3	.65	.6	.6	.5	
22	.65	.6	.75	1.2	.65	.65	.55	.5	
23	.65	.6	1.0	1.2	.65	.6	.55	.5	
24	.65	.6	1.0	1.1	.65	.65	.5	.55	
25	.6	.65	1.0	1.0	.6	.65	.5	.5	
26	.55	.65	1.1	.95	.55	.6	.5	.5	
27	.55	.6	1.1	.95	.55	.6	.55	.5	
28	.55	.6	1.05	.9	.6	.6	.55	.5	
29	.51	.65	1.15	.85	.6	.6	.55	.5	
30	.51	.6	1.1	.85	.55	.6	.55	.5	
31	.5		1.05		.5	.55		.5	

Daily discharge, in second-feet, of South Fork of Big Timber Creek near Big Timber, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	7.0	9.5	7.0	162	34	7.0	12	9.5	7.0
2	7.0	7.0	7.0	162	29	7.0	12	9.5	7.0
3	7.0	7.0	12	190	29	9.5	16	9.5	7.0
4	7.0	7.0	16	190	20	12	16	7.0	7.0
5	7.0	7.0	16	220	29	12	16	7.0	7.0
6	7.0	7.0	16	190	34	16	16	7.0	7.0
7	7.0	7.0	20	162	34	29	12	7.0	7.0
8	7.0	7.0	20	136	29	54	12	7.0	7.0
9	7.0	7.0	24	136	20	40	12	7.0	7.0
10	9.5	9.5	20	136	29	34	12	7.0	7.0
11	7.0	9.5	16	162	20	29	12	7.0	7.0
12	7.0	7.0	12	190	16	29	12	7.0	....
13	9.5	5.2	12	190	20	24	12	7.0	....
14	7.0	5.2	16	190	20	24	12	7.0	....
15	7.0	5.2	136	162	20	16	12	7.0	....
16	9.5	5.2	54	162	16	16	12	7.0	....
17	7.0	7.0	40	136	16	12	9.5	7.0	....
18	9.5	7.0	29	54	24	12	9.5	7.0	....
19	16	7.0	20	54	20	12	9.5	7.0	....
20	12	9.5	20	113	20	12	12	7.0	....
21	9.5	9.5	12	113	16	12	12	7.0	....
22	16	12	24	91	16	16	9.5	7.0	....
23	16	12	54	91	16	12	9.5	7.0	....
24	16	12	54	72	16	16	7.0	9.5	....
25	12	16	54	54	12	16	7.0	7.0	....
26	9.5	16	72	47	9.5	12	7.0	7.0	....
27	9.5	12	72	47	9.5	12	9.5	7.0	....
28	9.5	12	63	40	12	12	9.5	7.0	....
29	7.5	16	82	34	12	12	9.5	7.0	....
30	7.5	12	72	34	9.5	12	9.5	7.0	....
31	7.0	....	63	....	7.0	9.5	....	7.0	....

NOTE.—Daily discharge determined from a rating curve fairly well defined below 54 second-feet.

Monthly discharge of South Fork of Big Timber Creek near Big Timber, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a] 5.00	307	D.
February	....	....	[a] 5.00	278	D.
March	16	7.0	9.16	563	B.
April	16	5.2	9.08	540	B.
May	136	7.0	36.6	2,250	B.
June	220	34	124	7,380	C.
July	34	7.0	19.8	1,220	B.
August	54	7.0	17.7	1,090	B.
September	16	7.0	11.3	672	B.
October	9.5	7.0	7.32	450	B.
November	7.0	7.0	7.00	417	C.
December	....	....	[a] 5.00	307	D.
The year	....	....	21.3	15,500	

[a] Estimated.

NOTE.—Discharge Mar. 1 to 5 and Nov. 12 to 30 estimated at 7 second-feet.

BOULDER RIVER NEAR CONTACT, MONT.

Location.—In the SE. ¼ sec. 14, T. 3 S., R. 12 E., at the ranch of G. W. Baker, about 8 miles above McLeod post office, 4 miles from Contact, Mont., and 2½ miles below the Boulder Falls.

Records available.—May 1, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff, fastened to left abutment of private wagon bridge near the ranch buildings.

Channel.—Rocky; permanent.

Discharge measurements.—Made from the bridge or by wading just above the footbridge, which is some 400 yards above the gage.

Winter flow.—Affected by ice.

Accuracy.—Good.

Discharge measurements of Boulder River near Contact, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 31	C. S. Heidel	2.20	61
May 23	....do	3.5	504
July 14	R. Richards	4.02	850
Aug. 25	C. S. Heidel	2.76	198

Daily gage height, in feet, of Boulder River near Contact, Mont., for 1911.

[G. W. Baker, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	2.15	2.29	2.85	5.0	5.5	3.75	2.55	2.6	2.45
2	2.15	2.26	2.90	5.8	5.6	3.65	2.55	2.65	2.45
3	2.15	2.26	2.92	5.8	5.2	3.55	2.55	2.65	2.45
4	2.15	2.24	2.92	5.6	5.4	3.5	2.55	2.65	2.45
5	2.15	2.24	3.0	6.1	5.4	3.4	2.55	2.65	2.45
6	2.16	2.24	3.1	5.9	5.4	3.4	2.5	2.65	2.4
7	2.16	2.24	3.2	6.3	5.6	3.3	2.5	2.65	2.4
8	2.18	2.24	3.3	6.7	5.5	3.3	2.5	2.65	2.4
9	2.18	2.25	3.4	7.2	4.8	3.2	2.5	2.65	2.4
10	2.21	2.25	3.45	6.8	4.6	3.2	2.45	2.7	2.4
11	2.21	2.2	3.6	7.5	4.4	3.1	2.45	2.7	2.4
12	2.24	2.2	3.7	8.1	4.2	3.1	2.45	2.7	....
13	2.24	2.2	3.75	8.0	4.2	3.0	2.45	2.7	....
14	2.24	2.2	3.85	8.3	4.2	3.0	2.45	2.7	....
15	2.24	2.2	3.85	8.0	4.2	3.0	2.45	2.65	....
16	2.24	2.2	3.75	6.9	4.1	3.0	2.45	2.65	....
17	2.26	2.25	3.65	7.2	4.1	3.0	2.5	2.65	....
18	2.26	2.25	3.65	6.8	4.1	2.9	2.5	2.65	....
19	2.26	2.2	3.55	7.1	4.0	2.9	2.5	2.65	....
20	2.26	2.2	3.55	7.4	4.5	2.8	2.52	2.6	....
21	2.26	2.2	3.5	7.5	4.1	2.8	2.54	2.6	....
22	2.26	2.3	3.6	7.6	4.0	2.7	2.55	2.55	....
23	2.29	2.3	3.65	6.8	3.9	2.7	2.55	2.55	....
24	2.29	2.4	3.75	6.5	3.9	2.7	2.54	2.5	....
25	2.29	2.5	3.85	6.4	3.9	2.65	2.6	2.5	....
26	2.29	2.6	3.95	6.2	3.85	2.65	2.6	2.5	....
27	2.29	2.65	4.0	6.0	3.75	2.6	2.6	2.5	....
28	2.29	2.75	4.0	5.9	3.75	2.6	2.6	2.5	....
29	2.29	2.75	3.75	5.8	3.65	2.6	2.62	2.45	....
30	2.29	2.75	3.75	5.6	3.65	2.6	2.62	2.45	....
31	2.20	....	3.9	....	4.0	2.6	....	2.45	....

Daily discharge, in second-feet, of Boulder River near Contact, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	52	78	228	1,520	1,870	675	138	150	112
2	52	72	245	2,080	1,940	615	138	165	112
3	52	72	253	2,080	1,660	558	138	165	112
4	52	68	253	1,940	1,800	530	138	165	112
5	52	68	285	2,290	1,800	475	138	165	112
6	54	68	330	2,150	1,800	475	125	165	100
7	54	68	375	2,430	1,940	425	125	165	100
8	57	68	425	2,720	1,870	425	125	165	100
9	57	70	475	3,070	1,380	375	125	165	100
10	62	70	502	2,790	1,240	375	112	180	100
11	62	60	585	3,290	1,100	330	112	180	100
12	68	60	645	3,710	960	330	112	180	....
13	68	60	675	3,640	960	285	112	180	....
14	68	60	735	3,850	960	285	112	180	....
15	68	60	735	3,640	960	285	112	165	....
16	68	60	675	2,860	895	285	112	165	....
17	72	70	615	3,070	895	285	125	165	....
18	72	70	615	2,790	895	245	125	165	....
19	72	60	558	3,000	830	245	125	165	....
20	72	60	558	3,210	1,170	210	130	150	....
21	72	60	530	3,290	895	210	135	150	....
22	72	80	585	3,360	830	180	138	138	....
23	78	80	615	2,790	765	180	138	138	....
24	78	100	675	2,580	765	180	135	125	....
25	78	125	735	2,500	765	165	150	125	....
26	78	150	798	2,360	735	165	150	125	....
27	78	165	830	2,220	675	150	150	125	....
28	78	195	830	2,150	675	150	150	125	....
29	78	195	675	2,080	615	150	156	112	....
30	78	195	675	1,940	615	150	156	112	....
31	60	....	765	....	830	150	....	112	....

NOTE.—Daily discharge determined from a rating curve well defined below 1,200 second-feet.

Monthly discharge of Boulder River near Contact, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	30	1,840	D.
February	....	....	35	1,940	D.
March	78	52	66.5	4,090	A.
April	195	60	88.9	5,290	A.
May	830	228	564	34,700	A.
June	3,850	1,520	2,710	161,000	C.
July	1,940	615	1,130	69,500	B.
August	675	150	308	18,900	A.
September	156	112	131	7,800	A.
October	180	112	153	9,410	A.
November	....	....	96	5,710	C.
December	....	....	65	4,000	D.
The year	....	....	448	324,000	

NOTE.—Means for January, February, and December estimated. Discharge Nov. 12 to 30 estimated at 90 second-feet.

WEST FORK OF BOULDER RIVER AT McLEOD, MONT.

Location.—In the SE. ¼ sec. 16, T. 2 S., R. 13 E., at Koozer's private bridge, 200 hundred yards upstream from the highway bridge at McLeod post office.

Records available.—May 4, 1907, to December 31, 1911.

Drainage area.—137 square miles.

Gage.—Staff, fastened to piling of bridge near right bank; datum unchanged.

Channel.—Composed of bowlders; rough but permanent.

Discharge measurements.—Made from bridge or by wading.

Winter flow.—Affected by ice.

Diversions.—Water to irrigate about 800 acres of land is diverted above the station. A Carey Act project reclaiming 12,000 to 15,000 acres is now under investigation; the water is to be diverted from the West Fork about 12 miles above the station.

Accuracy.—Open-water records good.

Discharge measurements of West Fork of Boulder River at McLeod, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 31	C. S. Heidel	1.48	51
May 24	do	2.67	411
July 15	R. Richards	2.48	345
Aug. 25	C. S. Heidel	1.67	70

Daily gage height, in feet, of West Fork of Boulder River at McLeod, Mont., for 1911.

[Clyde Curtis, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1.45	1.8	3.6	2.9	2.05	1.6	1.6	1.65
2	....	1.4	1.85	3.9	2.8	2.1	1.6	1.65	1.65
3	....	1.4	1.85	3.7	2.7	2.25	1.7	1.6	1.6
4	....	1.45	1.85	3.6	2.8	2.15	1.65	1.6	1.6
5	....	1.5	1.9	3.4	3.0	2.15	1.7	1.65	1.6
6	....	1.5	2.0	3.4	2.8	2.0	1.6	1.6	1.55
7	....	1.45	2.05	3.5	3.0	2.0	1.6	1.65	1.55
8	....	1.5	2.2	3.6	2.9	2.15	1.65	1.65	1.55
9	....	1.45	2.4	3.5	2.5	2.05	1.6	1.65	1.6
10	....	1.4	2.45	3.9	2.45	2.05	1.65	1.7	1.55
11	....	1.5	2.6	4.0	2.45	2.0	1.6	1.65	1.55
12	....	1.45	2.6	4.2	2.45	1.9	1.6	1.7	1.5
13	....	1.45	2.5	4.3	2.45	1.95	1.7	1.65	1.5
14	....	1.4	2.6	3.8	2.45	1.85	1.65	1.65	1.5
15	1.3	1.4	2.7	3.9	2.35	1.85	1.65	1.7	1.5
16	1.3	1.45	2.5	3.8	2.2	1.8	1.6	1.65	....
17	1.3	1.45	2.4	3.7	2.2	1.7	1.6	1.7	....
18	1.35	1.5	2.35	3.7	2.2	1.75	1.6	1.65	....
19	1.35	1.5	2.3	3.8	2.2	1.7	1.55	1.65	....
20	1.4	1.55	2.2	3.9	2.35	1.75	1.6	1.7	....
21	1.4	1.55	2.2	3.8	2.25	1.7	1.6	1.65	....
22	1.45	1.55	2.25	3.7	2.2	1.65	1.6	1.7	....
23	1.5	1.55	2.25	3.5	2.2	1.7	1.65	1.65	....
24	1.5	1.6	2.7	3.4	2.1	1.65	1.6	1.65	....
25	1.5	1.65	2.8	3.4	2.1	1.7	1.6	1.7	....
26	1.45	1.65	2.7	3.4	2.5	1.65	1.55	1.65	....
27	1.45	1.7	2.7	3.4	2.1	1.65	1.55	1.7	....
28	1.5	1.7	2.8	3.3	2.1	1.65	1.65	1.6	....
29	1.45	1.75	3.0	3.2	2.0	1.6	1.6	1.6	....
30	1.4	1.8	3.1	3.0	2.05	1.65	1.65	1.65	....
31	1.45	....	3.0	....	2.0	1.6	....	1.6	....

Daily discharge, in second-feet, of West Fork of Boulder River at McLeod, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	50	105	1,010	545	178	69	69	77
2	....	45	118	1,280	490	195	69	77	77
3	....	45	118	1,100	440	248	85	69	69
4	....	50	118	1,010	490	213	77	69	69
5	....	56	130	860	600	213	85	77	69
6	....	56	160	860	490	160	69	69	62
7	....	50	178	935	600	160	69	77	62
8	....	56	230	1,010	545	213	77	77	62
9	....	50	305	935	345	178	69	77	69
10	....	45	325	1,280	325	178	77	85	62
11	....	56	390	1,370	325	160	69	77	62
12	....	50	390	1,570	325	130	69	85	56
13	....	50	345	1,670	325	145	85	77	56
14	....	45	390	1,180	325	118	77	77	56
15	36	45	440	1,280	285	118	77	85	56
16	36	50	345	1,180	230	105	69	77	....
17	36	50	305	1,100	230	85	69	85	....
18	40	56	285	1,100	230	95	69	77	....
19	40	56	265	1,180	230	85	62	77	....
20	45	62	230	1,280	285	95	69	85	....
21	45	62	230	1,180	248	85	69	77	....
22	50	62	218	1,100	230	77	69	85	....
23	56	62	248	935	230	85	77	77	....
24	56	69	440	860	195	77	69	77	....
25	56	77	490	860	195	85	69	85	....
26	50	77	440	860	345	77	62	77	....
27	50	85	440	860	195	77	62	85	....
28	56	85	490	790	195	77	77	69	....
29	50	95	600	725	160	69	69	69	....
30	45	105	660	600	178	77	77	77	....
31	50	....	600	....	160	69	....	69	....

NOTE.—Daily discharge determined from a rating curve well defined below 600 second-feet.

Monthly discharge of West Fork of Boulder River at McLeod, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 20	1,230	
February			[a] 20	1,110	
March	56	....	37.0	2,280	C.
April	105	45	60.1	3,580	B.
May	660	105	324	19,900	B.
June	1,670	600	1,060	63,100	C.
July	600	160	322	19,800	B.
August	248	69	127	7,810	B.
September	85	62	72.0	4,280	B.
October	85	69	77.3	4,750	B.
November	77	....	54.6	3,250	C.
December	....	....	[a] 35	2,150	
The year	1,670	....	185	133,000	

[a] Estimated.

NOTE.—Discharge Mar. 1 to 14 estimated at 25 second-feet per day; Nov. 16 to 30, estimated at 45 second-feet.

SWEETGRASS CREEK ABOVE MELVILLE, MONT.

Location.—In the SW. ¼ sec. 24, T. 5 N., R. 12 E., at C. M. Rein's ranch, 17 miles northwest of Melville and 35 miles from Big Timber, at the site of a reservoir proposed under the Carey Act.

Records available.—May 5, 1907, to September 30, 1911.

Drainage area.—47 square miles (total for stream).

Gage.—A staff nailed to lower side (right bank) of a footbridge directly behind the ranch buildings. When the station was established a secondary staff gage to be used during extreme high water was installed about 300 feet below the regular gage and at a different datum. The regular gage was undermined during the high water of June and July, 1908, and readings were discontinued August 19 of that year. The present gage, which is the old secondary gage, has been read since October 1, 1908. The gage heights on the new gage are not comparable with those read on the old gage.

Channel.—Composed of rough gravel.

Discharge measurements.—Made by wading near gage at ordinary stages; at high stages made from footbridge.

Winter flow.—Stream freezes over during winter months.

Diversions.—Two small ditches divert water above the station.

Discharge measurements of Sweetgrass Creek above Melville, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 29	C. S. Heidel	1.45	10.7
May 23	.....do	2.32	220
July 17	R. Richards	2.15	127
Aug. 8	C. S. Heidel	1.90	59.3

Daily gage height, in feet, of Sweetgrass Creek above Melville, Mont., for 1911.

[C. M. Rein, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	......	......	1.50	3.9	......	2.00	1.85	16	1.48	1.45	2.95	2.90	2.15	1.98	1.75
2	......	1.45	1.50	4.6	2.32	2.00	1.82	17	1.48	1.43	2.50	2.90	2.15	1.97	......
3	......	......	1.50	3.9	2.32	2.00	1.82	18	1.48	1.42	2.38	2.90	2.15	1.97	1.74
4	......	......	1.52	3.7	2.38	2.00	1.80	19	1.48	1.42	2.29	3.25	2.15	1.97	......
5	......	......	1.52	3.00	2.38	2.00	......	20	1.50	1.45	2.18	3.10	2.15	1.95	1.74
6	......	......	1.52	2.90	2.40	2.00	......	21	1.50	1.45	2.10	3.05	2.15	1.95	1.73
7	......	1.45	1.52	3.40	2.42	2.00	1.80	22	1.50	1.58	2.10	3.00	2.10	1.93	......
8	......	1.45	1.52	3.10	2.45	2.00	......	23	1.50	1.55	2.12	2.80	2.10	1.93	1.73
9	......	1.45	1.52	3.00	2.38	2.02	1.80	24	1.49	1.55	2.2	2.70	2.10	1.90	1.73
10	......	1.45	1.53	3.00	2.40	2.04	1.78	25	1.48	1.50	2.3	2.50	2.10	1.90	1.72
11	......	1.45	1.53	3.45	2.32	2.01	1.78	26	......	......	2.32	2.38	2.08	1.90	......
12	......	......	1.53	3.55	2.25	2.00	1.75	27	......	......	2.22	2.38	2.08	1.87	1.72
13	......	......	1.58	3.6	2.20	2.00	......	28	......	......	2.2	2.45	2.05	1.87	......
14	......	......	2.85	3.30	2.20	2.00	1.75	29	1.45	......	2.2	2.42	2.05	1.85	1.72
15	......	......	3.55	3.10	2.20	1.98	......	30	1.45	......	2.2	2.38	2.05	1.85	1.70
								31	1.45	......	2.35	......	2.00	1.85	......

Daily discharge, in second-feet, of Sweetgrass Creek above Melville, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	......	10	13	950	188	83	51	16	12	10	475	420	125	79	34
2	......	10	13	1,340	177	83	46	17	12	10	269	420	125	76	34
3	......	10	13	930	177	83	46	18	12	8.6	222	420	125	76	33
4	......	10	15	820	198	83	42	19	12	8.6	189	595	125	76	33
5	......	10	15	470	198	83	42	20	13	10	152	520	125	71	33
6	......	10	15	420	205	83	42	21	13	10	127	495	125	71	32
7	......	10	15	670	213	83	42	22	13	20	127	470	110	67	32
8	......	10	15	520	225	83	42	23	13	18	133	375	110	67	32
9	......	10	15	470	198	88	42	24	12	18	158	330	110	60	32
10	......	10	16	470	205	94	39	25	12	13	192	245	110	60	30
11	......	10	16	695	177	86	39	26	11	13	199	198	105	60	30
12	......	10	16	745	155	83	34	27	10	13	165	198	105	55	30
13	......	10	20	770	140	88	34	28	10	13	158	225	96	55	30
14	......	10	425	620	140	83	34	29	10	13	158	213	96	51	30
15	......	10	775	520	140	79	34	30	10	13	158	198	96	51	27
								31	10	......	210	......	83	51	......

NOTE.—Daily discharge determined from rating curves as follows: Mar. 16 to June 2, 1910, curve well defined; June 3 to Sept. 30, curve fairly well defined; discharge interpolated for days for which gage heights are missing.

Monthly discharge of Sweetgrass Creek above Melville, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 12	738	D.
February			[a] 12	666	D.
March	13		11.8	726	C.
April	20	8.6	11.4	678	D.
May	775	13	145	8,920	A.
June	1,340	198	524	31,200	C.
July	225	83	145	8,920	B.
August	94	51	73.7	4,530	B.
September	51	27	36.0	2,140	B.
The period				58,500	

[a] Estimated.

SWEETGRASS CREEK BELOW MELVILLE, MONT.

Location.—At McAllister's ranch, just above the head of the canal owned by the Glass-Lindsay Land Co.

Records available.—May 4, 1907 (at Adam's ranch site), to April 1, 1909; new site April 1, 1909, to August 31, 1911.

Drainage area.—Total for stream, 47 square miles.

Gage.—Staff, on left bank near observer's house; the original gage was located 2½ miles below the headgate of the Glass-Lindsay Land Co.'s canal, 9 miles below Melville and 20 miles from Big Timber. The present gage was installed April 1, 1909, when the old station was discontinued.

Channel.—Bed composed of clean gravel; nonshifting.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions and storage.—Many diversions are made from this stream. All the low-water flow is appropriated, 550 second-feet being held by adjudicated rights. The Glass-Lindsay canal will carry 575 second-feet and irrigate 30,000 acres; the canal will divert water into two storage reservoirs with capacities of 12,000 and 6,000 feet, respectively, which will be filled from the spring run-off.

Accuracy.—Records good.

Discharge measurements of Sweetgrass Creek below Melville, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 28	C. S. Heidel	1.12	35.8
May 25	....do	2.24	342
July 17	R. Richards	1.35	83
Aug. 23	C. S. Heidel	1.19	57.8

Daily gage height, in feet, of Sweetgrass Creek below Melville, Mont., for 1911.

[Alexander Harper, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Day.	Mar.	Apr.	May.	June.	July.	Aug.
1	......	1.15	1.10	2.60	1.45	1.25	16	......	1.12	3.90	2.50	1.35	1.25
2	......	1.15	1.10	3.55	1.50	1.25	17	......	1.10	3.75	2.45	1.35	1.25
3	......	1.10	1.10	3.00	1.45	1.25	18	......	1.10	2.00	2.50	1.35	1.28
4	......	1.10	1.00	2.74	1.50	1.25	19	......	1.10	1.50	2.45	1.35	1.25
5	......	1.10	.95	2.60	1.50	1.28	20	......	1.10	1.52	2.40	1.30	1.25
6	......	1.15	1.00	2.40	1.45	1.35	21	......	1.15	1.50	2.38	1.25	1.25
7	......	1.10	1.10	2.35	1.45	1.25	22	......	1.18	1.45	2.42	1.25	1.25
8	......	1.10	1.12	2.85	1.35	1.32	23	......	1.00	1.50	2.45	1.25	1.20
9	......	1.10	1.15	2.52	1.35	1.35	24	......	1.00	2.10	2.50	1.25	1.10
10	......	1.10	1.08	2.40	1.40	1.35	25	......	1.00	2.25	2.45	1.30	1.10
11	......	1.10	1.15	2.58	1.35	1.35	26	......	.95	2.45	2.35	1.25	1.10
12	......	1.10	1.15	2.58	1.35	1.35	27	......	1.05	2.00	2.05	1.25	......
13	......	1.10	1.15	2.55	1.35	1.35	28	1.12	1.10	1.62	1.70	1.25	......
14	......	1.10	2.45	2.50	1.35	1.35	29	1.25	1.10	1.50	1.58	1.3	......
15	......	1.15	2.65	2.45	1.40	1.28	30	1.22	1.10	1.45	1.50	1.25	......
							31	1.22	......	1.50	......	1.25	......

Daily discharge, in second-feet, of Sweetgrass Creek below Melville, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Day.	Mar.	Apr.	May.	June.	July.	Aug.
1	......	36	31	550	102	66	16	......	33	1,560	490	82	66
2	......	36	31	1,260	112	66	17	......	31	1,430	460	82	66
3	......	31	31	800	102	66	18	......	31	250	490	82	70
4	......	31	23	622	112	66	19	......	31	112	460	82	66
5	......	31	19	550	112	70	20	......	31	117	430	73	66
6	......	36	23	430	102	82	21	......	36	112	420	66	66
7	......	31	31	405	102	66	22	......	38	102	442	66	66
8	......	31	33	700	82	77	23	......	23	112	460	66	58
9	......	31	36	502	82	82	24	......	23	290	490	66	45
10	......	31	29	430	91	82	25	......	23	255	460	73	45
11	......	31	36	538	82	82	26	......	19	460	405	66	45
12	......	31	36	538	82	82	27	......	27	250	270	66	......
13	......	31	36	520	82	84	28	33.	31	140	161	66	......
14	......	31	440	490	82	82	29	46	31	112	130	73	......
15	......	36	562	460	91	70	30	42	31	102	112	66	......
							31	42	......	112	......	66	......

NOTE.—Discharge determined from rating curves as follows: Mar. 28 to May 17 (1910), curve well defined; May 18 to Aug. 1, from rating curve fairly well defined.

Monthly discharge of Sweetgrass Creek below Melville, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			30	1,840	D.
February			25	1,390	D.
March			21.8	1,340	D.
April	38	19	30.8	1,830	A.
May	1,560	19	223	13,700	B.
June	1,260	112	482	28,700	B.
July	112	66	82.5	5,070	B.
August	82	45	64.7	3,980	B.
The period				57,800	

NOTE.—Means for January and February estimated. Discharge Mar. 1 to 27 estimated at 25 second-feet per day, and Aug. 27 to 31 at 45 second-feet.

STILLWATER RIVER NEAR NYE, MONT.

Location.—In W. ½ SW. ¼ sec. 28, T. 5 S., R. 15 E., directly back of B. F. Wood's ranch, 1 mile below Woodbine Creek, and 7 miles from the junction of the West Fork.

Records available.—One discharge measurement during 1911.

Drainage area.—187 square miles.

Gage.—Standard chain.

Channel.—Rock, probably permanent.

Discharge measurements.—Made by wading or from cable.

Winter flow.—Affected by ice.

Diversion.—None of importance.

The following discharge measurement was made by C. S. Heidel:

August 29, 1911: Gage height, 3.98 feet; discharge, 213 second-feet.

STILLWATER RIVER NEAR ABSAROKEE, MONT.

Location.—On the public highway bridge crossing the stream at the Riverside Road house, 13 miles southwest of Columbus, Mont., and about 1 mile northeast of Absarokee, Mont.; below the mouth of Rosebud Creek.

Records available.—July 19, 1910, to October 31, 1911.

Drainage area.—Not measured.

Gage.—Staff gage nailed to right abutment pier on upstream side of bridge.

Channel.—Bed of stream is very rough, being composed of gravel and bowlders, but will not shift.

Discharge measurements.—Made from the lower side of the bridge.

Winter flow.—Affected by ice.

Diversions.—The territory bordering Stillwater River is well irrigated by water taken from the river.

Discharge measurements of Stillwater River near Absarokee, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 18	W. A. Lamb	1.93	1,170	Aug. 30	C. S. Heidel	1.18	724
July 13	R. Richards	3.00	2,350	Nov. 6	B. E. Jones	.42	318
Aug. 15	B. E. Jones	2.05	1,230	6	.....do	.42	318
16	.....do	2.02	1,240				

Daily gage height, in feet, of Stillwater River near Absarokee, Mont., for 1911.

[A. B. Tenney, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	3.68	3.6	2.5	1.2	0.75	......	16	......	5.2	3.0	2.0	1.0	0.55	......
2	......	4.2	3.6	2.6	1.2	.75	......	17	......	5.1	3.2	1.95	.85	.55	......
3	......	3.9	3.4	2.4	1.2	.75	......	18	1.9	5.4	3.2	2.0	.9	.6	......
4	......	4.2	3.5	2.2	1.3	.65	......	19	1.8	5.4	3.2	2.0	.9	.55	......
5	......	3.9	3.7	2.3	1.3	.55	......	20	1.6	5.1	2.9	1.9	.9	.45	......
6	......	3.9	4.0	2.6	1.35	.6	0.4	21	1.43	5.4	3.1	1.85	.85	.55	......
7	......	4.1	4.0	2.6	1.35	.65	.5	22	1.43	5.2	3.0	1.65	.75	.6	......
8	......	4.6	4.2	2.5	1.25	.7	......	23	1.5	5.1	2.9	1.65	.68	.6	......
9	......	4.6	3.6	2.4	1.25	.65	.48	24	2.0	4.5	2.8	1.6	.8	.6	......
10	......	4.2	3.1	2.3	1.1	.55	......	25	2.1	4.1	2.7	1.4	.85	.6	......
11	......	4.6	3.2	2.4	1.15	.6	.48	26	2.6	3.9	2.8	1.3	.9	.6	......
12	......	5.0	3.2	2.2	1.1	.6	......	27	2.3	3.6	2.9	1.2	.8	.28	......
13	......	5.9	2.9	1.95	1.0	.6	......	28	2.2	4.0	2.8	1.3	.9	.55	......
14	......	6.2	3.1	1.85	1.05	.6	......	29	2.2	3.7	2.6	1.13	.8	......	......
15	......	5.6	2.9	1.95	0.95	.6	......	30	2.2	3.5	2.5	1.15	.7	......	......
								31	2.1	......	2.28	1.13	......	......	......

Daily discharge, in second-feet, of Stillwater River near Absarokee, Mont., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	......	3,170	3,070	1,760	670	445	......	16	......	5,110	2,350	1,240	570	352
2	......	3,810	3,070	1,870	670	445	......	17	......	4,980	2,590	1,200	495	352
3	......	3,430	2,830	1,650	670	445	......	18	1,150	5,370	2,590	1,240	520	375
4	......	3,810	2,950	1,430	720	398	......	19	1,070	5,370	2,590	1,240	520	352
5	......	3,430	3,190	1,540	720	352	......	20	920	4,980	2,230	1,150	520	310
6	......	3,430	3,550	1,870	750	375	290	21	801	5,370	2,470	1,110	495	352
7	......	3,680	3,550	1,870	750	398	330	22	801	5,110	2,350	955	445	375
8	......	4,330	3,810	1,760	695	420	......	23	850	4,980	2,230	955	411	375
9	......	4,330	3,070	1,650	695	398	322	24	1,240	4,200	2,110	920	470	375
10	......	3,810	2,470	1,540	620	352	......	25	1,330	3,680	1,990	780	495	375
11	......	4,330	2,590	1,650	645	375	322	26	1,870	3,430	2,110	720	520	375
12	......	4,850	2,590	1,430	620	375	......	27	1,540	3,070	2,230	670	470	249
13	......	6,020	2,230	1,200	570	375	......	28	1,430	3,550	2,110	720	520	352
14	......	6,410	2,470	1,110	595	375	......	29	1,430	3,190	1,870	635	470	340
15	......	5,630	2,230	1,200	545	375	......	30	1,430	2,950	1,760	645	420	330
								31	1,330	......	1,520	635	......	320

NOTE.—Daily discharge determined from a fairly well defined rating curve; discharge estimated for days for which gage heights are missing.

Monthly discharge of Stillwater River near Absarokee, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 18-31	1,870	801	1,230	34,100	B.
June	6,410	2,950	4,330	258,000	C.
July	3,810	1,520	2,540	156,000	B.
August	1,870	635	1,240	76,200	B.
September	750	411	576	34,300	B.
October	445	249	370	22,800	B.
November	....	....	305	18,100	C.
December	....	....	250	15,400	D.
The period	....	....	....	615,000	

NOTE.—Mean for December estimated. Discharge Nov. 12 to 30 estimated at 300 second-feet.

WOODBINE CREEK NEAR NYE, MONT.

Location.—Gage is located 7 miles south of Nye, Mont., in the SE. ¼ sec. 32, T. 5 S., R. 15 E., approximately a quarter of a mile from the junction of this creek and the Stillwater River.

Records available.—Two measurements during 1911.

Gage.—Sloping staff.

Channel.—Large rocks; very rough.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversion.—None.

Measurements are made at this station to determine the amount of water available for power. In the first mile from its mouth the creek has a fall of 900 feet, and there is at present an application for development of its power.

Discharge measurements of Woodbine Creek near Nye, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
1911.		*Feet.*	*Sec.-ft.*
Aug. 12	B. E. Jones	3.05	47
29	C. S. Heidel	2.70	31

ROSEBUD RIVER AT ABSAROKEE, MONT.

Location.—In SW. ¼ SE. ¼ sec. 36, T. 3 S., R 18 W., on the highway bridge just west of Absarokee, Mont., and 14 miles from Columbus, about 1 mile above the stream's junction with Stillwater River.

Records available.—July 19, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff, on downstream side of left abutment pier.

Channel.—Bed of stream is composed of gravel and bowlders and is not likely to shift.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Affected by ice.

Diversions.—Water for irrigation is diverted above the station.

Discharge measurements of Rosebud River at Absarokee, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 18	W. A. Lamb	2.60	452
July 13	R. Richards	3.03	798
Aug. 16	B. E. Jones	2.85	647
30	C. S. Heidel	2.44	386
Nov. 7	B. E. Jones	1.81	147

Daily gage height, in feet, of Rosebud River at Absarokee, Mont., for 1911.

[Chris. Carstens, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	2.0	2.2	4.0	4.0	3.5	2.5	2.9
2	....	2.0	2.1	3.9	3.6	3.5	2.5	2.9
3	....	2.0	2.1	3.7	3.6	3.5	2.5	2.9
4	....	2.0	2.1	3.6	3.7	3.6	2.5	2.9
5	....	2.0	2.2	3.4	3.2	3.6	2.6	2.9
6	....	2.0	2.2	3.2	4.0	3.5	2.7	2.9
7	....	2.0	2.2	3.05	4.0	3.5	2.7	2.9
8	....	2.0	2.2	3.6	3.9	3.3	2.7	2.9
9	....	1.8	2.3	3.8	3.8	3.2	2.7	2.9
10		1.8	2.3	3.7	3.6	3.2	2.6	2.9
11	....	1.8	2.4	4.0	3.4	3.2	2.6	2.9
12	1.5	1.9	2.4	4.2	3.4	3.2	2.5	....
13	1.5	1.9	2.5	4.5	3.3	3.1	2.5	....
14	1.6	1.9	2.7	4.4	3.4	3.1	2.5	....
15	1.7	1.9	3.2	4.8	3.4	3.0	2.5	....
16	1.7	1.8	2.7	5.0	3.4	2.85	2.5	....
17	3.2	1.8	2.6	4.0	3.4	2.8	2.7	....
18	2.1	1.8	2.6	4.4	3.5	2.8	2.7	....
19	2.2	1.8	2.5	4.6	3.7	2.8	2.8	....
20	2.1	1.9	2.5	4.5	3.7	2.8	2.8	....
21	2.1	1.9	2.5	4.5	3.9	2.7	2.8	....
22	2.1	1.9	2.7	4.3	4.0	2.7	2.9	....
23	2.0	1.9	2.6	4.1	4.0	2.7	2.9	....
24	2.0	1.9	2.9	4.0	3.8	2.6	2.9	....
25	2.0	1.9	3.0	4.0	3.7	2.6	2.9	....
26	2.0	2.0	3.2	4.0	3.7	2.6	2.9	....
27	2.0	2.0	3.25	4.1	3.6	2.6	2.9	....
28	2.0	2.1	3.2	4.2	3.4	2.6	2.9	....
29	2.0	2.2	3.3	4.0	3.4	2.55	2.9	....
30	2.0	2.2	3.4	4.0	3.4	2.55	2.9	....
31	2.0	....	4.0	....	3.4	2.55	....	....

NOTE.—Gage heights Sept. 17 to Oct. 11 believed to be erroneous.

Daily discharge, in second-feet, of Rosebud River at Absarokee, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	....	190	260	2,350	2,350	1,470	410
2	....	190	225	2,150	1,630	1,470	410
3	....	190	225	1,800	1,630	1,470	410
4	....	190	225	1,630	1,800	1,630	410
5	....	190	260	1,320	1,050	1,630	480
6	....	190	260	1,050	2,350	1,470	550
7	....	190	260	875	2,350	1,470	550
8	....	190	260	1,630	2,150	1,180	550
9	....	135	300	1,970	1,970	1,050	550
10	....	135	300	1,800	1,630	1,050	480
11	....	135	350	2,350	1,320	1,050	480
12	90	160	350	2,750	1,320	1,050	410
13	90	160	410	3,350	1,180	930	410
14	100	160	550	3,150	1,320	930	410
15	115	160	1,050	4,020	1,320	820	410
16	115	135	550	4,500	1,320	675	410
17	300	135	480	2,350	1,320	630	....
18	225	135	480	3,150	1,470	630	....
19	260	135	410	3,580	1,800	630	....
20	225	160	410	3,350	1,800	630	....
21	225	160	410	3,350	2,150	550	....
22	225	160	550	2,950	2,350	550	....
23	190	160	480	2,550	2,350	550	....
24	190	160	720	2,350	1,970	480	....
25	190	160	820	2,350	1,800	480	....
26	190	190	1,050	2,350	1,800	480	....
27	190	190	1,120	2,550	1,630	480	....
28	190	225	1,050	2,750	1,320	480	....
29	190	260	1,180	2,350	1,320	445	....
30	190	260	1,320	2,350	1,320	445	....
31	190	....	2,750	....	1,320	445	....

NOTE.—Daily discharge determined from a rating curve well defined below 1,500 second-feet.

Monthly discharge of Rosebud River at Absarokee, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 12-31	300	90	184	7,300	B.
April	260	135	173	10,300	B.
May	2,750	225	615	37,800	B.
July	4,500	875	2,500	149,000	B.
June	2,350	1,050	1,690	104,000	B.
August	1,630	445	879	54,000	B.
September 1-16	550	410	458	14,500	B.
The period				377,000	

CLARK FORK AT FROMBERG, MONT.

Location.—In sec. 21, T. 5 S., R. 23 E., at the highway bridge half a mile east of the Northern Pacific Railway station at Fromberg, Mont.

Records available.—June 3, 1905, to December 31, 1911.

Drainage area.—2,500 square miles.

Gage.—A standard chain fastened to upstream side of bridge; datum unchanged. The original gage was a staff; its datum was the same as that of the chain gage.

Channel.—Bed of stream composed of rock and gravel; free from vegetation; permanent. Channel divided by middle pier of bridge.

Discharge measurements.—Made from bridge.

Winter flow.—Affected by ice from December to the middle of March.

Diversions.—Many diversions are made from the river, but only a small portion of the total flow is used.

Accuracy.—Records excellent.

The following discharge measurement was made by B. E. Jones:

August 9, 1911: Gage height, 4.63 feet; discharge, 1,170 second-feet.

Daily gage height, in feet, of Clark Fork at Fromberg, Mont., for 1911.

[Mrs. E. V. Moran, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		3.5	3.9	6.0	7.7	5.4	3.8	3.7	3.7
2		3.5	3.9	6.3	7.7	5.2	3.8	3.7	3.7
3		3.6	4.1	6.6	7.5	5.0	3.8	3.7	3.8
4		3.6	4.3	7.1	7.1	4.9	3.7	3.7	3.8
5	3.6	3.6	4.3	7.1	6.7	5.0	3.7	3.7	3.75
6	3.55	3.6	4.3	6.9	6.6	5.0	3.7	3.7	3.75
7	3.6	3.6	4.7	6.9	6.6	4.5	3.7	3.7	3.7
8	3.6	3.6	4.9	7.5	6.7	4.5	3.7	3.7	3.7
9	3.6	3.7	5.0	8.1	6.9	4.5	3.7	3.7	3.7
10	3.6	3.7	5.3	8.2	5.9	4.5	3.7	3.7	
11	3.5	3.7	5.3	8.4	5.8	4.2	3.7	3.7	
12	3.5	3.7	5.5	8.6	5.7	4.25	3.7	3.7	
13	3.5	3.6	5.5	8.9	5.7	4.2	3.7	3.7	
14	3.5	3.7	5.8	8.7	5.7	4.2	3.7	3.7	
15	3.5	3.7	6.2	8.8	5.5	4.2	3.7	3.7	
16	3.5	3.7	6.2	8.9	5.5	4.2	3.7	3.7	
17	3.4	3.6	6.2	8.6	5.5	4.2	3.7	3.7	
18	3.4	3.6	6.3	8.5	5.4	4.2	3.7	3.7	
19	3.4	3.6	6.5	8.5	5.1	4.2	3.7	3.7	
20	3.4	3.6	6.3	8.5	5.0	4.2	3.7	3.7	
21	3.4	3.6	6.1	8.4	5.0	4.1	3.75	3.7	
22	3.4	3.7	6.3	8.3	5.0	4.0	3.8	3.7	
23	3.4	4.1	5.9	8.2	4.9	4.0	3.8	3.7	
24	3.5	3.6	5.5	7.9	5.0	4.0	3.7	3.7	
25	3.5	3.6	5.5	7.6	5.0	4.0	3.7	3.7	
26	3.5	3.7	6.4	7.6	5.0	3.9	3.7	3.7	
27	3.4	3.7	6.4	7.6	5.4	3.9	3.7	3.7	
28	3.5	3.7	6.0	7.8	5.3	3.9	3.7	3.7	
29	3.5	3.6	5.9	7.8	5.0	3.9	3.7	3.7	
30	3.5	3.8	5.9	7.6	5.0	3.9	3.7	3.55	
31	3.5		5.9		5.4	3.9		3.7	

Daily discharge, in second-feet, of Clark Fork at Fromberg, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	300	325	555	2,860	6,230	2,040	490	430	430
2	325	325	555	3,360	6,230	1,800	490	430	430
3	350	375	700	3,880	5,740	1,560	490	430	490
4	350	375	860	4,840	4,840	1,440	430	430	490
5	375	375	860	4,840	4,060	1,560	430	430	460
6	350	375	860	4,440	3,880	1,560	430	430	460
7	375	375	1,230	4,440	3,880	1,040	430	430	430
8	375	375	1,440	5,740	4,060	1,040	430	430	430
9	375	430	1,560	7,330	4,440	1,040	430	430	430
10	375	430	1,920	7,620	2,710	1,040	430	430	....
11	325	430	1,920	8,210	2,560	780	430	430	....
12	325	430	2,160	8,810	2,420	820	430	430	....
13	325	375	2,160	9,710	2,420	780	430	430	....
14	325	430	2,560	9,110	2,420	780	430	430	....
15	325	430	3,180	9,410	2,160	780	430	430	....
16	325	430	3,180	9,710	2,160	780	430	430	....
17	275	375	3,180	8,810	2,160	780	430	430	....
18	275	375	3,360	8,510	2,040	780	430	430	....
19	275	375	3,700	8,510	1,680	780	430	430	....
20	275	375	3,360	8,510	1,560	780	430	430	....
21	275	375	3,020	8,210	1,560	700	460	430	....
22	275	430	3,360	7,910	1,560	625	490	430	....
23	275	700	2,710	7,620	1,440	625	490	430	....
24	325	375	2,160	6,760	1,560	625	430	430	....
25	325	375	2,160	5,980	1,560	625	430	430	....
26	325	430	3,520	5,980	1,560	555	430	430	....
27	275	430	3,520	5,980	2,040	555	430	430	....
28	325	430	2,860	6,490	1,920	555	430	430	....
29	325	375	2,710	6,490	1,560	555	430	430	....
30	325	490	2,710	5,980	1,560	555	430	350	....
31	325	....	2,710	....	2,040	555	....	430	....

NOTE.—Daily discharge determined from a rating curve well defined between 200 and 8,000 second-feet. Discharge Mar. 1 to 4 estimated.

Monthly discharge of Clark Fork at Fromberg, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a]250	15,400	D.
February	....	....	[a]275	15,300	D.
March	375	275	322	19,800	A.
April	700	325	406	24,200	A.
May	3,700	555	2,280	140,000	A.
June	9,710	2,860	6,870	409,000	A.
July	6,230	1,440	2,770	170,000	A.
August	2,040	555	919	56,500	A.
September	490	430	441	26,200	A.
October	430	350	427	26,300	A.
November	490	....	415	24,700	C.
December	....	....	[a]300	18,400	D.
The year	9,710	....	1,310	946,000	

[a] Estimated.

NOTE.—Discharge Nov. 10 to 30 estimated at 400 second-feet.

PRYOR CREEK NEAR PRYOR, MONT.

Location.—Three hundred feet above head gate of Pryor ditch, in sec. 21, T. 5 S., R. 25 E., about 2 miles from Pryor, Mont.

Records available.—September 12, 1911, to April 1, 1912, when station was discontinued. One measurement in 1911.

Drainage area.—Not measured.

Gage.—Vertical staff gage attached to a tree on the right bank of the stream, 300 feet above the headworks of Pryor ditch.

Channel.—Practically permanent; bottom of the stream is composed of gravel and cobblestone.

Discharge measurements.—Made by wading at the gage.

Winter flow.—Stream freezes solid at gage during the winter months.

Diversion.—No diversion above the gage.

The following discharge measurement was made by W. A. Lamb:

September 12, 1911: Gage height, 1.41 feet; discharge, 4.8 second-feet.

PRYOR CREEK NEAR COBURN, MONT.

Location.—At the ranch of John A. Hoyt, near Coburn, Mont., near south line of T. 1 S., R. 27 E.

Records available.—September 13, 1911, to December 31, 1911.

Gage.—Overhanging chain gage on left bank opposite the farm house of John A. Hoyt.

Channel.—Permanent. The bed of the stream at the gage is composed of gravel and sand, but at the control both above and below it is firm gravel and cobblestones. At low stages the water is deep and sluggish at the gage and for several hundred feet above and below.

Discharge measurement.—Made by wading above the gage.

Winter flow.—Channel is blocked with ice during winter months.

Diversion.—Water sufficient to irrigate approximately 1,000 acres near Pryor, about 30 miles above this station.

The following discharge measurement was made by W. A. Lamb:

September 13, 1911: Gage height, 4 feet; discharge, 23 second-feet.

Daily gage height, in feet, of Pryor Creek near Coburn, Mont., for 1911.

[John A. Hoyt, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	......	4.00	4.02	4.04	16	4.00	4.00	4.02	4.02
2	......	4.00	4.02	4.04	17	4.00	4.00	4.02	......
3	......	4.00	4.01	4.04	18	4.00	4.00	4.02	......
4	......	4.00	4.01	4.04	19	4.00	4.02	4.03	......
5	......	4.00	4.01	4.04	20	4.01	4.02	4.03	......
6	......	4.00	4.01	4.04	21	4.00	4.02	4.04	......
7	......	4.00	4.01	4.04	22	4.01	4.02	4.04	......
8	......	4.00	4.01	4.04	23	4.01	4.01	4.04	......
9	......	4.00	4.01	4.04	24	4.02	4.01	4.04	4.03
10	......	4.00	4.02	4.02	25	4.02	4.01	4.04	4.03
11	......	4.00	4.02	4.02	26	4.01	4.01	4.04	4.03
12	......	4.00	4.02	4.02	27	4.01	4.01	4.04	4.03
13	......	4.00	4.02	4.02	28	4.00	4.01	4.04	4.03
14	4.01	4.00	4.02	4.02	29	4.00	4.03	4.04	4.03
15	4.00	4.00	4.02	4.02	30	4.00	4.03	4.04	4.03
					31	......	4.03	......	......

PRYOR CREEK AT HUNTLEY, MONT.

Location.—In the SW. ¼ sec. 25, T. 2 N., R. 27 E., at the steel highway bridge half a mile from the railroad station at Huntley.

Records available.—August 6, 1904, to December 31, 1911.

Drainage area.—800 square miles.

Gage.—Chain; installed June 16, 1906, at the highway bridge crossing the new channel, into which the creek was at that time turned by the United States Reclamation Service; datum unchanged since 1906.

Channel.—Bed composed of clay and gravel and may change somewhat; banks steep and uniformly graded, clean, and not subject to overflow; current moderate.

Discharge measurements.—Made from the bridge to which the gage is attached.

Winter flow.—Stream freezes over during the winter months.

Discharge measurements of Pryor Creek at Huntley, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 12	W. A. Lamb	1.38	45	Aug. 10	B. E. Jones	1.31	26
12	do	1.38	47	Sept. 11	R. Richards	1.20	18
July 25	B. E. Jones	0.90	5.5	Nov. 16	W. A. Lamb	1.35	23.3
25	do	0.90	6.0				

Daily gage height, in feet, of Pryor Creek at Huntley, Mont., for 1911.

[Arthur Foster, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.40	4.8	4.2	1.52	1.40	1.50	1.10	0.95	1.15	1.10	1.30	1.40
2	1.50	4.8	4.2	1.48	1.40	1.75	1.10	0.88	1.20	1.10	1.30	1.40
3	1.50	4.8	4.2	1.48	1.40	1.50	1.10	1.02	1.15	1.20	1.30	1.40
4	1.60	4.8	4.2	1.45	1.38	1.50	1.08	1.05	1.20	......	1.50	1.40
5	1.70	4.5	4.2	1.45	1.38	1.45	1.05	0.95	1.15	......	1.50	1.40
6	1.70	4.2	4.8	1.42	1.38	1.35	1.04	1.00	1.20	......	1.60	1.40
7	1.90	4.2	5.2	1.42	1.35	1.35	1.00	......	1.15	......	1.65	1.40
8	2.10	4.2	7.2	1.42	1.35	1.30	1.00	......	1.20	......	1.65	1.40
9	2.75	4.10	......	1.42	1.35	3.20	1.00	......	1.20	......	1.85	1.38
10	2.75	4.0	......	1.40	1.35	1.75	1.00	......	1.20	......	1.85	1.38
11	2.75	4.0	......	1.40	1.35	1.55	1.00	......	1.20	......	1.85	1.38
12	2.75	4.2	2.60	1.40	1.32	1.50	1.00	......	1.20	......	1.85	1.35
13	2.75	4.0	2.15	1.40	1.32	1.40	0.90	......	1.20	......	1.85	1.35
14	2.75	4.2	2.00	1.40	1.30	1.40	0.88	......	1.20	......	1.85	1.35
15	2.75	4.3	2.00	1.40	1.30	1.40	0.88	1.15	1.20	......	1.85	1.35
16	2.75	4.3	1.80	1.38	1.30	1.40	0.88	1.20	1.20	1.31	......	1.35
17	2.75	4.6	1.70	1.35	1.35	1.35	0.88	1.10	1.18	1.30	1.35	1.40
18	2.75	4.6	1.50	1.35	1.30	2.10	0.88	1.10	1.18	1.30	1.40	1.42
19	2.75	4.6	1.50	1.35	1.32	1.45	0.90	1.10	1.20	1.30	1.40	1.50
20	2.75	4.6	1.60	1.40	1.32	1.25	0.85	1.05	1.18	1.28	1.45	1.50
21	2.75	4.3	1.50	1.40	1.30	1.25	0.92	1.10	1.18	1.28	1.50	1.53
22	2.75	4.3	1.50	1.40	1.30	1.20	0.90	1.05	1.18	1.28	1.50	1.58
23	2.75	4.3	1.50	1.40	1.28	1.20	0.95	1.10	1.25	1.28	1.45	1.60
24	2.75	4.1	1.50	1.45	1.28	1.18	0.98	1.05	1.23	1.28	1.45	1.70
25	2.75	4.1	1.50	1.50	1.32	1.15	0.88	1.15	1.20	1.30	1.40	1.70
26	2.75	4.1	1.50	1.50	1.50	1.18	1.05	1.20	1.20	1.30	1.40	1.70
27	2.75	4.1	1.50	1.50	1.80	1.15	1.00	1.15	1.18	1.31	1.35	1.70
28	2.75	4.1	1.80	1.45	2.00	1.15	1.04	1.22	1.15	1.28	1.30	1.70
29	2.75	......	1.75	1.40	1.60	1.15	1.00	1.20	1.15	1.30	1.35	1.65
30	3.8	......	1.70	1.40	1.15	1.05	0.95	1.15	1.15	1.30	1.40	1.65
31	6.7	......	1.70	......	1.55	......	0.95	1.20	......	1.30	......	1.65

NOTE.—Gage height distorted by ice Jan. 1 to Mar. 12 and Nov. 4 to Dec. 31.

Daily discharge, in second-feet, of Pryor Creek at Huntley, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	22	59	47	57	20	6	13	8	20
2	22	55	47	85	20	2	17	8	20
3	22	55	47	57	20	9	13	15	20
4	22	52	45	57	18	6	17	15	....
5	22	52	45	52	16	3	13	15	....
6	30	49	45	42	15	5	17	16	....
7	50	42	42	42	12	10	13	16	....
8	100	49	42	38	12	15	17	17	....
9	125	49	42	272	12	20	17	17	....
10	150	47	42	85	12	26	17	18	....
11	175	47	42	62	12	23	17	18	....
12	194	47	40	57	12	21	16	19	....
13	136	47	40	47	6.0	19	16	19	....
14	116	47	38	47	5.2	16	16	20	....
15	116	47	38	47	5.2	13	16	21	....
16	91	45	38	47	5.2	17	16	22	....
17	79	42	42	42	5.2	9	15	21	....
18	57	42	38	129	5.2	9	15	21	....
19	57	42	40	52	6.0	9	16	21	....
20	68	47	40	34	4.0	6	15	20	....
21	57	47	38	34	7.2	9	15	20	....
22	57	47	38	29	6.0	6	15	20	....
23	57	47	36	29	9.0	9	19	20	....
24	57	52	36	27	11	6	17	20	....
25	57	57	40	24	5.2	13	15	21	....
26	57	57	57	27	15	17	15	20	....
27	57	57	91	24	11	13	14	21	....
28	91	52	116	24	14	19	11	18	....
29	85	47	68	24	11	17	11	20	....
30	79	47	24	16	6	13	11	20	....
31	79	....	62	....	6	17	....	20	....

NOTE.—Daily discharge determined as follows: Mar. 12 to July 25, from curve parallel to 1910 curve but poorly defined; July 25 to Aug. 9 and Sept. 12 to Nov. 3, by indirect method for shifting channels; Aug. 10 to Sept. 11, from curve poorly defined. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Pryor Creek at Huntley, Mont., for 1911.

[Drainage area, 800 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	....	....	[a] 20	0.025	0.03	1,230	
February	....	....	[a] 22	.028	.03	1,220	
March	194	22	77	.096	.11	4,730	C.
April	59	42	49.3	.062	.07	2,930	C.
May	116	24	46.6	.058	.07	2,870	C.
June	272	16	53.6	.067	.07	3,190	C.
July	20	4	10.5	.013	.02	646	C.
August	26	2	12.4	.016	.02	762	C.
September	19	11	15.2	.019	.02	904	C.
October	22	8	18.3	.023	.03	1,130	C.
November	....	....	[a] 20	.025	.03	1,190	
December	....	....	[a] 20	.025	.03	1,230	
The year	272	2	30.4	.038	.53	22,000	

[a] Estimated.

WIND RIVER AT DUBOIS, WYO.

Location.—At Dubois, in sec. 7, T. 41 N., R. 106 W., just below the mouth of Horse Creek, the nearest tributary.

Records available.—August 4, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—Springs keep the river open during the winter months.

Diversions.—A number of irrigation ditches divert water above the station.

Accuracy.—Sufficient discharge measurements have not been made to afford a basis for estimates of flow.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Wind River at Dubois, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 7	O. M. Wimmer	6.15	318
9	do	6.55	444
Nov. 5	H. B. Waha	5.90	174

Daily gage height, in feet, of Wind River at Dubois, Wyo., for 1910.

[Earl French, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Day.	Aug.	Sept.	Oct.	Nov.
1		5.85	5.8	5.8	16	5.9	5.8	5.8	5.7
2		5.85	5.8	5.8	17	5.95	5.8	5.8	5.9
3		5.85	5.8	5.8	18	5.9	5.8	5.8	5.95
4	6.0	5.85	5.8	5.8	19	5.9	5.8	5.8	5.9
5	6.0	5.85	5.8	5.6	20	5.9	5.8	5.8	5.95
6	5.95	5.85	5.8	5.7	21	5.85	5.8	5.8	5.95
7	5.95	5.8	5.8	5.85	22	5.9	5.85	5.8	5.85
8	5.95	5.8	5.8	5.8	23	5.85	5.85	5.8	5.75
9	5.95	5.85	5.8	5.8	24	5.85	5.8	5.8	5.8
10	5.95	5.85	5.8	5.8	25	5.8	5.8	5.8	5.8
11	5.9	5.85	5.8	5.75	26	5.85	5.85	5.8	5.75
12	6.0	5.9	5.8	5.75	27	5.85	5.85	5.8	5.75
13	6.0	5.9	5.9	5.75	28	5.85	5.8	5.7	5.7
14	5.95	5.85	5.8	5.7	29	5.85	5.75	5.7	5.75
15	5.95	5.85	5.8	5.65	30	5.85	5.75	5.65	5.85
					31	5.85		5.7	

Daily gage height, in feet, of Wind River at Dubois, Wyo., for 1911.

[Earl French, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.70	5.55	5.55	5.65	5.70	7.90	8.05	6.50	5.95	5.98	5.68	5.80
2	5.80	5.55	5.55	5.70	5.80	8.25	7.95	6.45	5.95	6.10	5.70	5.75
3	5.70	5.60	5.55	5.75	5.75	8.15	7.75	6.40	5.95	6.05	5.82	5.75
4	5.70	5.60	5.55	5.70	5.80	8.35	7.85	6.38	5.95	6.02	5.88	5.80
5	5.50	5.60	5.55	5.60	6.00	8.60	7.80	6.35	5.98	6.00	5.92	5.85
6	5.50	5.60	5.55	5.60	6.20	8.65	7.80	6.30	6.08	6.00	5.80	5.85
7	5.50	5.60	5.60	5.60	6.15	8.85	7.70	6.30	6.05	6.00	5.70	5.90
8	5.50	5.55	5.55	5.60	6.20	9.20	7.75	6.32	6.05	5.98	5.92	5.90
9	5.55	5.60	5.55	5.60	6.50	9.05	7.45	6.28	6.02	5.95	5.88	5.85
10	5.50	5.55	5.55	5.60	6.32	8.40	7.25	6.25	6.00	5.95	5.90	5.85
11	5.50	5.55	5.55	5.60	6.18	8.85	7.30	6.25	6.00	5.95	5.88	5.85
12	5.55	5.55	5.60	5.60	6.20	9.30	7.25	6.25	6.02	5.95	5.88	5.80
13	5.55	5.57	5.60	5.65	6.42	9.85	7.20	6.22	6.15	5.95	5.82	5.80
14	5.55	5.60	5.65	5.65	6.50	9.55	7.15	6.22	6.05	5.96	5.88	5.80
15	5.55	5.55	5.65	5.65	6.95	9.70	7.18	6.18	6.02	5.95	5.90	5.80
16	5.60	5.55	5.65	5.65	6.95	10.20	7.20	6.18	6.00	5.92	5.90	5.80
17	5.50	5.50	5.55	5.65	6.82	10.05	7.17	6.15	5.98	5.88	5.88	5.88
18	5.55	5.50	5.65	5.65	6.68	10.60	7.10	6.15	5.95	5.82	5.90	5.80
19	5.55	5.55	5.65	5.70	6.55	9.95	7.10	6.12	5.96	5.72	5.85	5.80
20	5.55	5.50	5.65	5.65	6.40	9.90	6.98	6.10	5.98	5.70	5.88	5.80
21	5.50	5.50	5.65	5.70	6.35	9.85	6.92	6.12	5.98	5.75	5.85	5.80
22	5.50	5.50	5.60	5.65	6.50	9.50	6.92	6.08	5.95	5.80	5.88	5.80
23	5.55	5.50	5.65	5.65	6.58	9.00	6.88	6.05	5.95	5.82	5.85	5.80
24	5.60	5.50	5.65	5.65	6.85	8.85	6.75	6.02	5.96	5.82	5.85	5.80
25	5.60	5.50	5.65	5.65	7.05	8.45	6.78	6.00	5.95	5.85	5.82	5.80
26	5.60	5.50	5.60	5.80	7.20	8.35	6.80	6.02	5.95	5.82	5.80	5.80
27	5.60	5.50	5.65	5.90	6.95	8.20	6.75	6.02	5.95	5.75	5.75	5.80
28	5.60	5.50	5.70	5.80	6.70	8.10	6.65	6.00	5.95	5.70	5.75	5.80
29	5.60	....	5.65	5.90	6.82	8.05	6.60	5.98	5.96	5.70	5.80	5.80
30	5.60	....	5.65	5.80	6.80	8.15	6.58	5.95	5.95	5.68	5.80	5.80
31	5.60	....	5.65	....	7.12	....	6.60	5.95	....	5.68	....	5.80

WIND RIVER AT RIVERTON, WYO.

Location.—At highway bridge in sec. 2, T. 1 S., R. 4 E., three-fourths of a mile east of Riverton and three-fourths of a mile above its junction with Little Wind River.

Records available.—May 15 to November 11, 1911. From May 14, 1906, to November 1, 1908, a station was maintained at Walker's ferry, about 1 mile above the present station. As no streams enter between, the records at the two points are comparable.

Drainage area.—2,090 square miles (measured from Land Office map).

Gage.—Chain gage.

Channel.—Shifting after high water.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 34 second-feet from Wind River above the station, and of 91 second-feet from tributaries entering above.

Accuracy.—Conditions are favorable for accurate results and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Wind River at Riverton, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 15	Fletcher and Kingdon	6.00	1,460	July 1	R. H. Fletcher	8.41	5,960
June 7	E. O. Christiansen	7.90	4,930	19	.....do	7.80	4,450
10	.....do	8.50	5,920	Oct. 16	G. H. Russell	4.73	508
17	.....do	10.50	11,100				

Daily gage height, in feet, of Wind River at Riverton, Wyo., for 1911.

[Frances Feris, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		6.70	8.50	6.55	5.40	4.82	4.52	16	6.40	9.80	7.60	6.05	4.95	4.73	
2		7.30	8.40	6.55	5.40	4.95	4.54	17	6.25	10.10	7.70	6.05	4.92	4.70	
3		7.50	8.10	6.45	5.45	5.05	4.66	18	6.05	10.10	7.80	6.00	4.88	4.70	
4		7.60	8.00	6.35	5.65	4.98	4.58	19	5.98	10.30	7.80	6.10	4.78	4.68	
5		7.90	8.10	6.20	5.60	4.92	4.50	20	5.70	10.20	7.70	6.10	4.78	4.68	
6		8.10	8.20	6.30	5.55	4.96	4.50	21	5.50	10.00	7.60	6.10	4.72	4.55	
7		8.20	8.30	6.15	5.55	4.92	4.51	22	5.40	10.00	7.60	6.10	4.62	4.40	
8		8.50	8.40	6.00	5.55	4.92	4.48	23	5.50	9.90	7.50	6.05	4.65	4.55	
9		8.60	8.20	5.90	5.40	4.82	4.48	24	5.80	9.70	7.30	5.90	4.69	4.61	
10		8.40	8.10	5.90	5.30	4.92	4.54	25	6.15	9.40	7.30	5.80	4.68	4.60	
11		8.00	7.70	5.95	5.10	4.88	4.48	26	6.40	8.80	7.20	5.70	4.70	4.60	
12		8.30	7.60	5.95	4.90	4.80		27	6.50	8.60	7.20	5.60	4.68	4.62	
13		9.00	7.50	6.00	4.92	4.77		28	6.30	8.60	7.00	5.50	4.68	4.61	
14		9.50	7.50	6.00	4.91	4.72		29	6.10	8.40	6.85	5.40	4.66	4.58	
15	6.10	9.50	7.50	5.95	4.98	4.72		30	6.00	8.40	6.65	5.40	4.72	4.52	
								31	6.10		6.70	5.30		4.51	

Daily discharge, in second-feet, of Wind River at Riverton, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		2,470	6,080	2,240	895	559	437
2		3,540	5,850	2,240	895	620	444
3		3,940	5,200	2,080	932	672	489
4		4,150	4,990	1,940	1,100	635	458
5		4,780	5,200	1,730	1,050	605	430
6		5,200	5,410	1,870	1,030	625	430
7		5,410	5,630	1,660	1,030	605	434
8		6,080	5,850	1,470	1,030	605	424
9		6,310	5,410	1,350	895	559	424
10		5,850	5,200	1,350	825	605	444
11		4,990	4,360	1,410	700	586	424
12		5,630	4,150	1,410	595	550	
13		7,270	3,940	1,470	605	536	
14		8,520	3,940	1,470	600	514	
15	1,600	8,520	3,940	1,410	635	514	
16	2,010	9,280	4,150	1,540	620	518	
17	1,800	10,100	4,360	1,540	605	505	
18	1,540	10,100	4,570	1,470	586	505	
19	1,350	10,600	4,570	1,600	441	497	
20	1,140	10,300	4,360	1,600	441	497	
21	970	9,800	4,150	1,600	514	448	
22	895	9,800	4,150	1,600	473	400	
23	970	9,540	3,940	1,540	485	448	
24	1,240	9,020	3,540	1,350	501	469	
25	1,660	8,270	3,540	1,240	497	465	
26	2,010	6,790	3,350	1,140	505	465	
27	2,160	6,310	3,350	1,050	497	473	
28	1,870	6,310	2,980	970	497	469	
29	1,600	5,850	2,720	895	489	458	
30	1,470	5,850	2,390	895	514	437	
31	1,600		2,470	825		434	

Note.—Daily discharge determined from a well-defined rating curve,

Monthly discharge of Wind River at Riverton, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off.	Accuracy.
	Maximum.	Minimum.	Mean.	Total in acre-feet.	
May 15-31	2,160	895	1,520	51,300	A.
June	10,600	2,470	7,020	418,000	A.
July	6,080	2,390	4,310	265,000	A.
August	2,240	825	1,480	91,000	A.
September	1,100	441	683	40,600	A.
October	672	400	525	32,300	A.
November 1-11	489	424	439	9,890	A.
December					
The period				908,000	

BIGHORN RIVER AT THERMOPOLIS, WYO.

Location.—In sec. 19, T. 43 N., R. 95 W., on the public highway bridge between Thermopolis and the Thermopolis Hot Springs.

Records available.—May 28, 1900, to December 31, 1905; June 30, 1910, to December 31, 1911.

Drainage area.—8,180 square miles.

Gage.—Staff, fastened securely to the downstream side of the middle pier; datum unchanged.

Channel.—The bed of the stream is composed of rock and gravel, and is practically permanent.

Discharge measurements.—Made from the highway bridge.

Winter flow.—Little affected by ice.

Diversions.—Irrigation is carried on extensively on the tributaries of Bighorn River, but not from the river itself.

Discharge measurements of Bighorn River at Thermopolis, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 24	W. A. Lamb	2.05	1,650
June 23	R. Richards	10.05	15,440
Aug. 2	B. E. Jones	2.38	2,330
3	.....do	2.39	2,340
Oct. 28	.....do	1.10	748

Daily gage height, in feet, of Bighorn River at Thermopolis, Wyo., for 1911.

[Samuel Nelson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1.0	1.4	1.0	1.4	2.6	5.1	2.2	1.2	0.75	0.95
2	....	1.0	1.4	1.0	1.3	2.8	5.4	2.4	1.3	0.75	0.95
3	....	1.0	1.4	0.9	1.3	4.9	5.0	2.2	1.3	0.8	0.95
4	....	1.0	1.4	0.9	1.2	4.3	4.8	2.2	1.4	1.0	1.0
5	....	1.0	1.0	1.0	1.2	4.3	4.7	2.3	1.5	1.0	1.0
6	....	1.0	1.0	1.0	1.2	5.3	4.7	2.4	1.4	1.1	1.0
7	....	1.0	1.0	1.2	1.6	5.8	4.7	2.3	1.45	1.2	0.8
8	....	1.0	1.0	1.0	2.0	6.0	4.8	2.2	1.5	1.2	0.9
9	....	1.0	1.0	0.9	2.0	6.5	5.0	2.0	1.5	1.2	0.9
10	0.7	1.0	1.0	1.0	2.3	7.0	4.7	1.95	1.5	1.25	1.1
11	1.0	1.0	1.0	1.0	2.5	5.6	4.3	1.95	1.4	1.3	1.2
12	1.0	1.0	1.0	1.0	2.3	5.7	3.7	2.0	1.2	1.3	1.3
13	1.0	1.0	1.1	1.0	2.0	6.0	3.5	1.95	1.0	1.2	1.5
14	1.0	1.0	1.1	1.0	2.0	7.5	3.5	2.0	1.1	1.2	1.2
15	1.0	1.0	1.2	1.0	1.8	8.4	3.5	2.0	0.9	1.3	1.1
16	1.0	1.0	1.2	0.9	1.4	9.0	3.5	1.95	1.0	1.3	1.1
17	1.0	1.0	1.0	0.9	2.2	9.9	3.6	2.2	1.0	1.3	1.1
18	1.0	1.0	1.0	0.9	2.8	10.8	3.8	2.25	1.0	1.2	1.1
19	1.0	1.0	1.0	0.7	2.7	11.5	3.8	2.3	0.9	1.1	....
20	1.0	1.0	1.0	0.8	2.6	11.0	3.9	2.0	0.9	1.1	....
21	1.0	1.0	1.2	0.8	2.4	10.5	3.8	1.95	0.9	0.9	....
22	0.9	1.8	1.2	1.0	2.0	10.2	3.7	1.9	0.95	0.8	....
23	0.9	1.8	1.3	0.9	2.3	10.1	3.5	1.9	0.8	1.0	....
24	0.9	1.0	1.3	1.1	2.0	9.8	3.4	1.8	0.8	1.0	....
25	0.9	1.0	1.3	1.0	2.3	9.0	3.3	1.7	0.8	1.0	....
26	0.9	1.0	1.2	1.0	2.6	6.6	3.2	1.6	0.75	1.0	....
27	0.9	1.0	1.2	0.9	2.7	5.9	3.1	1.6	0.75	1.0	....
28	0.9	1.0	1.0	1.0	2.8	5.8	3.0	1.55	0.7	1.1	....
29	0.9	....	1.1	1.1	2.8	5.6	2.9	1.5	0.7	1.05	....
30	0.9	....	1.1	1.1	2.8	5.3	2.6	1.3	0.7	0.95	....
31	1.0	....	1.1	....	2.7	....	2.4	1.2	....	9.95	....

NOTE.—Gage heights Jan.. Feb., Mar. and Apr. 7 distorted by ice.

Daily discharge, in second-feet, of Bighorn River at Thermopolis, Wyo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	660	970	2,590	6,770	1,960	810	485	625
2	660	890	2,910	7,280	2,270	890	485	625
3	590	890	6,430	6,600	1,960	890	520	625
4	590	810	5,410	6,260	1,960	970	660	660
5	660	810	5,410	6,090	2,110	1,060	660	660
6	660	810	7,110	6,090	2,270	970	730	660
7	660	1,160	7,960	6,090	2,110	1,020	810	520
8	660	1,660	8,300	6,260	1,960	1,060	810	590
9	590	1,660	9,150	6,600	1,660	1,060	810	590
10	660	2,110	10,000	6,090	1,590	1,060	850	730
11	660	2,430	9,320	5,410	1,590	970	890	810
12	660	2,110	7,790	4,390	1,660	810	890	890
13	660	1,660	8,300	4,050	1,590	660	810	1,060
14	660	1,660	10,800	4,050	1,660	730	810	810
15	660	1,390	12,400	4,050	1,660	590	890	730
16	590	970	13,500	4,050	1,590	660	890	730
17	590	1,960	15,100	4,220	1,960	660	890	730
18	590	2,910	16,700	4,560	2,040	660	810	730
19	450	2,750	18,000	4,560	2,110	590	730	720
20	520	2,590	17,100	4,730	1,660	590	730	710
21	520	2,270	16,200	4,560	1,590	590	590	700
22	660	1,660	15,700	4,390	1,520	625	520	690
23	590	2,110	15,500	4,050	1,520	520	660	680
24	730	1,660	14,900	3,880	1,390	520	660	660
25	660	2,110	13,500	3,710	1,270	520	660	640
26	660	2,590	9,320	3,550	1,160	485	660	620
27	590	2,750	8,130	3,390	1,160	485	660	580
28	660	2,910	7,960	3,230	1,110	450	730	570
29	730	2,910	7,620	3,070	1,060	450	095	560
30	730	2,910	7,110	2,590	890	450	625	550
31	....	2,750	....	2,270	810	....	625	....

NOTE.—Daily discharge determined from a rating curve fairly well defined between 650 and 17,000 second-feet. Discharge estimated Apr. 7 and Nov. 19 to 30.

Monthly discharge of Bighorn River at Thermopolis, Wyo., for 1911.

[Drainage area, 8,180 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a] 500	0.061	0.07	30,700	D.
February			[a] 500	.061	.06	27,800	D.
March			[a] 600	.073	.08	36,900	D.
April	810	450	637	.078	.09	37,900	B.
May	2,910	810	1,900	.232	.27	117,000	B.
June	18,000	2,590	10,300	1.26	1.41	613,000	C.
July	7,280	2,270	4,740	.579	.67	291,000	B.
August	2,270	810	1,640	.200	.23	101,000	B.
September	1,060	450	727	.089	.10	43,300	B.
October	890	485	718	.088	.10	44,100	B.
November	1,060	520	678	.083	.09	40,300	B.
December			[a] 550	.067	.08	33,800	D.
The year	18,000		1,970	.240	3.25	1,420,000	

[a] Estimated.

BIGHORN RIVER NEAR HARDIN, MONT.

Location.—In the SW. ¼, sec. 13, T. 1 S., R. 33 E., at the bridge of the Burlington & Missouri River Railroad, about half a mile above the junction of Bighorn and Little Bighorn rivers, 2 miles from Hardin, Mont.

Records available.—June 16, 1904, to December 31, 1911.

Drainage area.—20,700 square miles.

Gage.—A chain attached to west span of railroad bridge; datum unchanged since August 10, 1905.

Channel.—Composed of gravel; free from vegetation.

Discharge measurements.—Made from railroad bridge.

Winter flow.—Affected by ice.

Diversions.—Water is diverted a few miles above the station by a private irrigation company to irrigate land on the west side of the river.

Discharge measurements of Bighorn River near Hardin, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 16	W. A. Lamb	3.73	3,630
July 26	B. E. Jones	4.77	7,870
Sept. 4	W. A. Lamb	3.70	3,970

Daily gage height, in feet, of Bighorn River near Hardin, Mont., for 1911.

[H. R. Kean, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2.9	3.0	4.3	5.8	4.3	3.65	2.95	2.6
2	....	2.85	3.15	4.6	5.8	4.3	3.6	2.95	2.6
3	....	3.0	3.1	4.6	5.7	4.3	3.6	2.95	2.7
4	....	3.0	3.0	4.7	5.6	4.3	3.6	3.0	2.8
5	....	3.0	3.0	4.8	5.5	4.2	3.55	3.0	2.8
6	....	2.9	2.95	5.2	5.2	4.3	3.55	3.0	2.8
7	....	2.85	3.0	5.5	5.1	4.4	3.5	3.0	2.7
8	....	2.9	3.0	5.3	5.1	4.4	3.5	3.0	2.6
9	....	2.9	3.2	5.6	5.1	4.3	3.5	3.0	2.5
10	....	3.0	3.3	5.6	5.2	4.2	3.45	3.0	2.55
11	....	3.0	3.65	5.7	5.2	4.1	3.6	3.0	2.0
12	....	2.95	3.7	5.7	5.3	4.1	3.5	3.0	2.0
13	....	3.0	3.7	5.8	5.2	4.0	3.5	3.0	2.3
14	....	3.0	3.7	5.8	4.9	4.1	3.4	3.0	2.3
15	....	3.0	3.65	6.7	4.8	4.0	3.4	2.8	2.5
16	....	2.8	3.85	6.7	4.6	4.0	3.3	2.7	2.7
17	3.9	2.7	4.3	7.3	4.6	3.9	3.3	2.7	2.9
18	3.9	2.7	4.2	7.3	4.6	3.9	3.2	2.7	3.1
19	3.15	2.6	4.2	7.3	4.8	3.95	3.2	2.7	3.1
20	3.0	2.6	4.1	7.5	4.7	3.85	3.15	2.7	3.0
21	2.9	2.8	4.1	7.7	4.8	3.9	3.2	2.7	3.4
22	3.1	2.9	4.0	7.6	4.9	3.85	3.1	2.6	3.1
23	3.05	2.9	3.8	7.6	4.9	3.85	3.0	2.6	3.0
24	3.1	2.9	3.8	7.2	4.8	3.85	3.0	2.6	3.0
25	3.1	3.0	3.8	6.9	4.6	3.75	3.0	2.6	2.95
26	3.1	3.0	3.8	6.8	4.6	3.8	2.9	2.6	2.9
27	3.05	3.0	3.1	6.7	4.6	3.8	2.9	2.6	2.9
28	2.95	3.0	4.5	6.6	4.4	3.8	2.9	2.6	2.85
29	2.95	3.0	4.3	6.2	4.4	3.7	2.9	2.6	2.85
30	2.95	2.8	4.2	5.9	4.4	3.7	2.8	2.6	2.8
31	2.95	....	4.2	....	4.6	3.65	....	2.6	....

Daily discharge, in second-feet, of Bighorn River near Hardin, Mont., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1,820	1,990	5,380	12,200	5,860	3,870	2,150	1,560
2	....	1,740	2,270	6,400	12,200	5,860	3,730	2,150	1,560
3	....	1,990	2,170	6,400	11,700	5,860	3,730	2,150	1,710
4	....	1,990	1,990	6,760	11,300	5,860	3,730	2,250	1,880
5	....	1,990	1,990	7,130	10,800	5,520	3,590	2,250	1,880
6	....	1,820	1,900	8,710	9,460	5,860	3,590	2,250	1,880
7	....	1,740	1,990	10,000	9,020	6,220	3,450	2,250	1,710
8	....	1,820	1,990	9,130	9,020	6,220	3,450	2,250	1,560
9	....	1,820	2,370	10,400	9,020	5,860	3,450	2,250	1,420
10	....	1,990	2,590	10,400	9,460	5,520	3,320	2,250	1,490
11	....	1,990	3,480	10,900	9,460	5,200	3,730	2,250	870
12	....	1,900	3,610	10,900	9,900	5,200	3,450	2,250	870
13	....	1,990	3,610	11,300	9,460	4,900	3,450	2,250	....
14	....	1,990	3,610	11,300	8,180	5,200	3,180	2,250	....
15	....	1,990	3,480	16,000	7,780	4,900	3,180	1,880	....
16	....	1,660	4,020	16,000	6,980	4,900	2,920	1,710	....
17	....	1,510	5,380	19,400	6,980	4,600	2,920	1,710	....
18	....	1,510	5,060	19,400	6,980	4,600	2,680	1,710	....
19	....	1,370	5,060	19,400	7,780	4,750	2,680	1,710	....
20	....	1,370	4,750	20,600	7,380	4,450	2,570	1,710	....
21	1,820	1,660	4,750	21,800	7,780	4,600	2,680	1,710	....
22	2,170	1,820	4,450	22,400	8,180	4,450	2,460	1,560	....
23	2,080	1,820	3,880	22,400	8,180	4,450	2,250	1,560	....
24	2,170	1,820	3,880	19,900	7,780	4,450	2,250	1,560	....
25	2,170	1,990	3,880	18,100	6,980	4,160	2,250	1,560	....
26	2,170	1,990	3,880	17,500	6,980	4,300	2,060	1,560	....
27	2,080	1,990	2,170	17,000	6,980	4,300	2,060	1,560	....
28	1,900	1,990	6,050	16,400	6,220	4,300	2,060	1,560	....
29	1,900	1,990	5,380	14,200	6,220	4,010	2,060	1,560	....
30	1,900	1,660	5,060	12,700	6,220	4,010	1,880	1,560	....
31	1,900	....	5,060	....	6,980	3,870	....	1,560	....

NOTE.—Daily discharge determined from two well-defined rating curves, applicable Mar. 21 to June 21 and June 22 to Nov. 12, respectively.

Monthly discharge of Bighorn River near Hardin, Mont., for 1911.

[Drainage area, 20,700 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			1,000	0.048	0.06	61,500	D.
February			1,200	.058	.06	66,600	D.
March	2,170		1,690	.082	.09	104,000	C.
April	1,990	1,370	1,820	.088	.10	108,000	B.
May	6,050	1,900	3,600	.174	.20	221,000	B.
June	22,400	5,380	13,900	.672	.75	827,000	B.
July	12,200	6,220	8,500	.411	.47	523,000	B.
August	6,220	3,870	4,980	.241	.28	306,000	B.
September	3,870	1,880	2,960	.143	.16	176,000	B.
October	2,250	1,560	1,900	.092	.11	117,000	B.
November	1,880	870	1,210	.058	.06	72,000	C.
December			1,000	.048	.06	61,500	D.
The year	22,400		3,660	.177	2.40	2,640,000	

NOTE.—Means for January, February, and December, estimated; mean for period Mar. 1 to 20 estimated at 1,500 second-feet; mean for period Nov. 13 to 30 estimated at 1,000 second-feet.

WARM SPRINGS CREEK NEAR DUBOIS, WYO.

Location.—In sec. 32, T. 42 N., R. 107 W., 150 feet above Wind River, about 6 miles above Dubois. The nearest tributary is a small stream entering from the south half a mile above.

Records available.—Fragmentary gage heights May 9 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from footbridge at the station.

Winter flow.—Springs keep the creek open during the winter months.

Diversions.—There were adjudicated decrees for diversion of 0.6 second-foot from Warm Springs Creek prior to July 1, 1912.

Accuracy.—Owing to insufficient data it is not possible to make estimates of discharge.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Warm Springs Creek near Dubois, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 9	O. M. Wimmer	0.40	72.5
Nov. 5	H. B. Waha	.20	48.5

Daily gage height, in feet, of Warm Springs Creek near Dubois, Wyo., for 1911.

[K. S. Clark, observer.]

Day.	May.	June.	Sept.	Oct.	Nov.	Dec.	Day.	May.	June.	Sept.	Oct.	Nov.	Dec.
1			0.20				16		3.10			0.20	0.20
2					0.15	0.20	17						
3							18						
4		2.70					19						
5					.20		20						.19
6							21						
7			.15				22	0.60					
8						.20	23	.90					
9	0.40				.20		24						
10	.30						25						
11							26				0.22		.19
12							27						
13							28	.80		0.25			
14					.21		29					.20	
15							30						
							31						

HORSE CREEK AT DUBOIS, WYO.

Location.—At Dubois, in sec. 7, T. 41 N., R. 106 W., 100 yards above the mouth and 1¼ miles below the entrance of Piney Creek.

Records available.—August 4, 1910, to November 13, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge at the station during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 14 second-feet from Horse Creek above the station.

Accuracy.—Owing to lack of high water measurements no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Horse Creek at Dubois, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 7	O. M. Wimmer	9.40	59.8
9	do	9.70	102
Nov. 5	H. B. Waha	9.10	33.0

Daily gage height, in feet, of Horse Creek at Dubois, Wyo., for 1910.

[Earl French, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	9.0	8.75	8.95	9.45	16	9.0	8.8	9.0	8.85	9.55
2	......	9.0	8.8	8.95	9.5	17	9.05	8.8	9.0	8.85	9.9
3	......	9.0	8.8	8.95	9.55	18	9.0	8.85	9.0	8.85	9.8
4	9.2	9.0	8.8	8.9	9.5	19	9.0	8.85	8.95	8.85	9.85
5	9.2	9.0	8.8	9.05	9.45	20	9.0	8.8	8.95	9.0	10.25
6	9.15	9.0	8.8	9.0	9.5	21	9.0	8.85	8.95	9.2	9.6
7	9.15	8.85	8.75	9.0	9.7	22	9.0	9.0	8.95	9.1	9.4
8	9.15	8.85	8.9	9.0	9.9	23	9.0	8.9	8.95	9.0	10.1
9	9.1	9.0	8.9	9.0	9.8	24	9.0	8.85	8.95	9.0	10.45
10	9.1	9.0	8.9	8.95	9.7	25	8.9	8.8	8.95	8.95	10.3
11	9.1	9.0	8.9	8.95	9.6	26	8.95	8.8	8.95	9.0	10.5
12	9.1	9.0	8.9	8.95	9.5	27	9.0	8.8	8.95	9.2	10.6
13	9.15	8.85	9.0	8.85	9.55	28	9.0	8.8	8.9	9.5	11.0
14	9.1	8.8	9.0	8.85	9.5	29	9.0	8.75	8.9	9.6	......
15	9.05	8.8	9.0	8.8	9.55	30	9.0	8.75	8.8	9.6	......
						31	9.0	......	8.8	9.45	......

NOTE.—Gage height distorted by ice after Nov. 25, 1910.

Daily gage height, in feet, of Horse Creek at Dubois, Wyo., for 1911.

[Earl French, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	10.30	10.75	9.62	9.05	9.08	8.98
2	....	10.25	10.80	9.58	9.05	9.15	8.98
3	....	10.15	10.60	9.48	9.05	9.10	9.05
4	....	10.35	10.55	9.50	9.05	9.10	9.10
5	....	10.45	10.75	9.45	9.10	9.10	9.10
6	....	10.50	10.75	9.38	9.20	9.10	9.00
7	9.40	10.55	10.75	9.38	9.15	9.10	9.15
8	....	10.80	10.70	9.38	9.15	9.08	9.28
9	9.60	10.85	10.35	9.40	9.15	9.05	9.22
10	9.50	10.50	10.25	9.38	9.15	9.05	9.20
11	9.35	10.50	10.20	9.38	9.15	9.05	9.12
12	9.45	10.30	10.25	9.35	9.18	9.05	9.18
13	9.62	11.10	10.18	9.35	9.18	9.05	9.18
14	9.65	10.45	10.18	9.38	9.12	9.05	....
15	10.15	10.65	10.15	9.32	9.10	9.05	....
16	9.85	11.85	10.15	9.32	9.10	9.02	....
17	9.68	11.75	10.12	9.28	9.10	9.00	....
18	9.65	12.30	10.20	9.28	9.10	9.00	....
19	9.55	11.95	10.18	9.28	9.08	8.98	....
20	9.50	11.85	10.00	9.25	9.05	8.95	....
21	9.40	11.70	9.95	9.22	9.05	8.98	....
22	9.52	11.60	9.90	9.20	9.05	8.95	....
23	9.58	11.40	9.88.	9.18	9.05	8.90	....
24	9.72	11.35	9.82	9.15	9.05	8.92	....
25	9.75	10.95	9.80	9.18	9.05	8.90	....
26	9.82	10.90	9.85	9.12	9.05	8.92	....
27	9.75	10.80	9.82	9.15	9.05	8.92	....
28	9.65	10.75	9.72	9.10	9.05	8.88	....
29	9.72	10.75	9.68	9.08	9.05	8.90	....
30	9.75	10.75	9.68	9.05	9.05	8.92	....
31	9.82	....	9.68	9.05	....	8.95	....

LITTLE WIND RIVER ABOVE ARAPAHOE, WYO.

Location.—At railroad bridge in sec. 23, T. 1 S., R. 3 E., opposite the Indian subagency, one-fourth mile above Arapahoe, and one-fourth mile above the mouth of Popo Agie River.

Records available.—May 14 to November 11, 1911. From May 11, 1906, to December 17, 1909, a station was maintained a short distance above the present site. The flow at the two points is comparable.

Drainage area.—Not measured.

Gage.—Chain gage reading approximately 1.6 feet higher than the gage at the former site.

Channel.—Somewhat shifting after high water.

Discharge measurements.—Made from railroad bridge.

Winter flow.—Ice causes backwater during the winter months and records are discontinued.

Diversions.—There were adjudicated decrees for 4.3 second-feet from Little Wind River above the station prior to July 1, 1912.

Accuracy.—Conditions are favorable for accurate results and the estimates should be excellent.

Cooperation.—Station is maintained in cooperation with the State engineer.

Discharge measurements of Little Wind River above Arapahoe, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 14	Fletcher and Kingdon.	3.00	251	June 16	E. O. Christiansen.....	5.75	2,740
June 6	E. O. Christiansen....	4.45	1,260	30	R. H. Fletcher.........	4.50	1,300
9	.....do.................	4.80	1,680	July 19	.....do..................	3.85	798
13	.....do.................	5.00	1,920	Oct. 15	G. H. Russell..........	2.30	74.3

Daily gage height, in feet, of Little Wind River above Arapahoe, Wyo., for 1911.

[J. E. Plummer, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	3.40	4.70	3.05	1.98	2.35	2.15	16	3.32	5.80	3.80	2.45	1.92	2.30	......
2	......	3.65	4.65	2.98	1.95	2.32	2.12	17	3.00	6.50	3.80	2.40	1.92	2.30	......
3	......	3.70	4.50	2.92	1.90	2.50	2.08	18	2.95	6.10	3.80	2.40	1.90	2.32	......
4	......	3.90	4.35	2.88	1.95	2.52	2.20	19	2.90	5.80	3.90	2.38	1.90	2.30	......
5	......	4.20	4.40	2.80	2.00	2.50	2.20	20	2.80	5.70	3.90	2.35	1.90	2.25	......
6	......	4.40	4.45	2.85	2.00	2.55	2.20	21	2.68	5.70	3.80	2.30	1.90	2.22	......
7	......	4.45	4.45	2.78	2.02	2.52	2.15	22	2.65	5.80	3.60	2.30	1.85	2.20	......
8	......	4.70	4.40	2.75	2.08	2.55	2.20	23	2.82	5.70	3.60	2.35	1.80	2.30	......
9	......	4.80	4.40	2.65	2.05	2.42	2.05	24	3.05	5.40	3.60	2.32	1.80	2.30	......
10	......	4.50	4.15	2.60	2.02	2.40	2.30	25	3.15	5.20	3.50	2.32	1.75	2.30	......
11	......	4.20	3.90	2.55	2.00	2.35	2.15	26	3.20	4.90	3.48	2.30	1.75	2.25	......
12	......	4.60	3.80	2.60	1.95	2.40	......	27	3.30	4.60	3.40	2.28	1.78	2.20	......
13	......	4.90	3.70	2.55	1.90	2.32	......	28	3.20	4.60	3.38	2.25	1.90	2.15	......
14	3.00	5.20	3.70	2.48	1.90	2.32	......	29	3.12	4.60	3.30	2.20	2.12	2.12	......
15	3.05	5.30	3.70	2.40	1.90	2.25	......	30	3.08	4.50	3.20	2.15	2.28	2.15	......
								31	3.15	......	3.12	2.02	......	2.25	......

Daily discharge, in second-feet, of Little Wind River above Arapahoe, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	470	1,540	285	33	85	56
2	....	628	1,480	258	31	80	52
3	....	660	1,330	237	27	116	48
4	....	805	1,200	224	31	121	62
5	....	1,050	1,240	198	35	116	62
6	....	1,240	1,280	214	35	128	62
7	....	1,280	1,280	192	37	121	56
8	....	1,540	1,240	183	43	128	62
9	....	1,640	1,240	154	40	103	40
10	....	1,330	1,010	141	37	94	76
11	....	1,050	805	128	35	85	56
12	....	1,430	730	141	31	94	....
13	....	1,750	660	128	27	80	....
14	265	2,090	660	112	27	80	....
15	285	2,210	660	94	27	69	....
16	422	2,830	730	105	29	76	....
17	265	3,730	730	94	29	76	....
18	248	3,210	730	94	27	80	....
19	230	2,830	805	90	27	76	....
20	198	2,700	805	85	27	69	....
21	163	2,700	730	76	27	65	....
22	155	2,830	595	76	24	62	....
23	204	2,700	595	85	20	76	....
24	285	2,330	595	80	20	76	....
25	330	2,090	530	80	18	76	....
26	355	1,750	518	76	18	69	....
27	410	1,430	470	73	19	62	....
28	355	1,430	458	69	27	56	....
29	315	1,430	410	62	52	52	....
30	298	1,330	355	56	73	56	....
31	330	....	315	37	....	69	....

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Little Wind River above Arapahoe, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 14-31	422	155	284	11,300	A.
June	3,730	470	1,820	108,000	A.
July	1,540	315	830	51,000	A.
August	285	37	127	7,810	A.
September	73	18	31.1	1,850	A.
October	128	52	83.7	5,150	A.
November 1-11	76	40	57.5	1,250	A.
The period	....	....	....	186,000	

LITTLE WIND RIVER BELOW ARAPAHOE, WYO.

Location.—At highway bridge in sec. 23, T. 1 S., R. 3 E., one-half mile below Arapahoe. Popo Agie River enters 200 yards above. Little Wind River enters Wind River 6 miles below, and between the station and mouth Beaver Creek enters.

Records available.—May 11, 1906, to November 27, 1909; May 14 to November 11, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff; datum unchanged since it was originally placed in 1906. From June 19 to July 19, 1911, a temporary gage was used whose datum was 2.95 feet higher. This was replaced on the latter date by a gage reading to the original datum. All readings are referred to the original datum.

Channel.—Slightly shifting.

Discharge measurements.—Made from highway bridge.

Winter flow.—The river is frozen over during the winter months and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 4.3 second-feet from Little Wind River and diversions of 563 second-feet from the Popo Agie and tributaries.

Accuracy.—Although there is a slight shift, frequent measurements have defined this, and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Little Wind River below Arapahoe, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 14	Fletcher and Kingdon	2.90	1,050	June 14	E. O. Christiansen...	6.62	4,940
June 6	E. O. Christiansen...	5.25	3,090	16	.....do...............	7.57	6,980
8	.....do...............	5.87	3,840	Oct. 15	G. H. Russell........	1.48	231

Daily gage height, in feet, of Little Wind River below Arapahoe, Wyo., for 1911.

[J. E. Plummer, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1....	......	3.6	4.7	2.00	0.78	1.38	1.25	16....	3.2	7.6	3.2	1.38	0.85	1.42	......
2....	......	4.1	4.5	1.92	.75	1.48	1.25	17....	2.95	......	3.3	1.32	.85	1.48	......
3....	......	4.2	4.4	1.88	.75	1.72	1.12	18....	2.9	......	3.2	1.28	.80	1.52	......
4....	......	4.5	4.3	1.78	.80	1.70	1.28	19....	2.7	6.5	3.6	1.25	.80	1.40	......
5....	......	5.1	4.2	1.70	.85	1.65	1.28	20....	2.5	6.5	3.4	1.18	.80	1.38	......
6....	......	5.2	4.4	1.78	.92	1.70	1.28	21....	2.3	6.8	3.2	1.12	.78	1.38	......
7....	......	5.4	4.2	1.78	1.05	1.68	1.22	22....	2.2	7.0	3.1	1.15	.75	1.35	......
8....	......	5.7	4.2	1.70	1.10	1.70	1.28	23....	2.4	6.5	3.0	1.15	.75	1.42	......
9....	......	5.8	4.1	1.62	1.08	1.60	1.35	24....	2.9	6.0	2.9	1.10	.72	1.42	......
10....	......	5.4	3.8	1.50	1.00	1.50	1.35	25....	2.9	5.5	2.8	1.10	.70	1.40	......
11....	......	4.8	3.4	1.50	1.00	1.52	1.20	26....	3.2	5.0	2.7	1.10	.70	1.40	......
12....	......	5.5	3.2	1.55	.90	1.52	......	27....	3.2	4.6	2.6	1.10	.72	1.38	......
13....	......	6.1	3.2	1.50	.88	1.50	......	28....	2.95	4.6	2.5	1.10	.90	1.32	......
14....	2.9	6.3	3.0	1.40	.85	1.50	......	29....	2.8	4.5	2.4	1.02	1.15	1.25	......
15....	3.0	6.6	3.1	1.38	.88	1.42	......	30....	2.8	4.4	2.2	.95	1.32	1.25	......
								31....	2.95	......	2.1	.88	......	1.32	......

Daily discharge, in second-feet, of Little Wind River below Arapahoe, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1,560	2,530	485	62	223	180
2	....	1,990	2,350	445	58	258	180
3	....	2,080	2,260	426	58	354	141
4	....	2,350	2,170	381	65	345	189
5	....	2.920	2,080	345	75	325	189
6	....	3,030	2,260	381	90	345	189
7	....	3,250	2,080	381	122	337	171
8	....	3,610	2,080	345	135	345	189
9	....	3,740	1,990	313	130	305	212
10	....	3,250	1,720	265	110	265	212
11	....	2,620	1,400	265	110	273	165
12	....	3,370	1,250	285	85	273	....
13	....	4,140	1,250	265	81	265	....
14	1,040	4,430	1,110	230	75	265	....
15	1,110	4,920	1,180	223	81	237	....
16	1,250	7,060	1,250	223	75	237	....
17	1,080	9,660	1,320	202	75	258	....
18	1,040	7,840	1,250	189	65	273	....
19	900	4,750	1,560	180	65	230	....
20	770	4,750	1,400	159	65	223	....
21	650	5,270	1,250	141	62	223	....
22	595	5,660	1,180	150	58	212	....
23	710	4,750	1,110	150	58	237	....
24	1,040	4,000	1,040	135	53	237	....
25	1,040	3,370	970	135	50	230	....
26	1,250	2,820	900	135	50	230	....
27	1,250	2,440	835	135	53	223	....
28	1,080	2,440	770	135	85	202	....
29	970	2,350	710	115	150	180	....
30	970	2,260	595	98	202	180	....
31	1,080	....	540	81	....	202	....

NOTE.—Daily discharge determined from a fairly well-defined rating curve; discharge estimated June 17 and 18.

Monthly discharge of Little Wind River below Arapahoe, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 14-31	1,250	595	990	35,300	B.
June	9,660	1,560	3,890	231,000	B.
July	2,530	540	1,430	87,900	B.
August	485	81	239	14,700	B.
September	202	50	83.4	4,960	B.
October	354	180	258	15,900	B.
November 1-11	212	141	183	4,000	B.
The period	....	....	....	394,000	

POPO AGIE RIVER NEAR LANDER, WYO.

Location.—On the Middle Fork, in the Yellowstone National Forest, at the ranger station in sec. 24, T. 32 N., R. 101 W. The nearest tributary enters several miles below.

Records available.—April 1 to November 9, 1911.

Drainage area.—Not measured.

Gage.—Staff gage used until June 17, 1911, when it was washed out by high water. A new staff gage was installed reading 7.86 feet higher than the original gage. All readings have been referred to the latter gage.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Appropriations amounting to 164 second-feet have been adjudicated on this stream prior to July 1, 1912. Very nearly all of this water is diverted below the station.

Accuracy.—Owing to a lack of high-water measurements, no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Popo Agie River near Lander, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 2	O. M. Wimmer	8.96	53.2
3	....do	9.06	59.4
12	....do	9.66	190
Nov. 2	H. B. Waha	8.70	22.5

Daily gage height, in feet, of Popo Agie River near Lander, Wyo., for 1911.

[Chas. J. Bayer, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	8.55	8.95	10.35			8.80	9.20	8.65
2	8.58	8.95	10.40			8.82	9.15	8.75
3	8.59	8.92	10.45		9.30	8.82	9.30	8.60
4	8.55	9.80	10.70		9.30	8.85	9.00	8.60
5		9.65	10.85	10.20	9.25	8.85	9.25	8.55
6	8.50	9.40	10.80	10.15	9.40	9.05	9.20	8.55
7	8.50	9.45	11.05	10.20	9.35	8.95	9.05	8.55
8	8.48	9.90			9.28	8.90	9.05	8.55
9		9.85			9.28	8.90	9.05	8.50
10	8.50	10.00	10.35		9.25	8.80	9.00	
11	8.52	10.00	10.75	9.80		8.80		
12	8.50	9.85	11.15	9.85	9.25	8.80		
13	8.48	9.80	11.15	9.90	9.20	8.80	8.90	
14	8.46	9.75	11.15	9.80	9.18	8.80	8.95	
15	8.45	9.80	11.30	9.80	9.18	8.78	8.80	
16		10.50	11.45	9.90	9.20	8.80	8.82	
17	8.48	9.85	11.25	9.85			8.82	
18	8.48	9.75	10.70	9.90	9.12	8.65	8.80	
19	8.50	9.45	11.00		9.10	8.65	8.80	
20	8.52		11.00		9.10		8.80	
21	8.52	9.50	11.40	9.70	9.10	8.70	8.78	
22	8.50			9.75	9.10	8.65	8.70	
23		9.75	11.05	9.65	9.08	8.65		
24	8.68	9.80	10.75	9.65	9.05	8.65		
25	8.75	10.05	10.40	9.62			8.70	
26	8.92	10.05	10.30	9.60		8.68	8.68	
27	9.10	9.90	10.25	9.62		8.85	8.70	
28	9.15	9.85	10.40	9.60		9.05	8.72	
29	9.15	9.80	10.30			9.00	8.72	
30		9.85		9.55	8.80	8.95	8.72	
31		10.10		9.50	8.80		8.65	

LITTLE POPO AGIE RIVER AT HUDSON, WYO.

Location.—A short distance below the highway bridge three-eighths of a mile southwest of Hudson. No tributary between the station and the mouth of the river.

Records available.—August 26, 1907, to December 31, 1909; June 19 to November 11, 1911.

Drainage area.—Approximately 360 square miles.

Gage.—Chain gage. The original gage was located at the highway bridge. On June 13, 1908, a chain gage was installed at the present site, at a somewhat different datum, but was set to read the same as the original gage for the stage at which it was installed.

Channel.—Practically permanent.

Discharge measurements.—Made from the highway bridge during high water and by wading during low stages.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Prior to July 1, 1912, adjudicated diversions from Little Popo Agie River above the station amounted to 49 second-feet and from the tributaries 20 second-feet.

Accuracy.—As the station has not been completely rated no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Little Popo Agie River at Hudson, Wyo., in 1911.

Date.	Hydrographer.	Gage height	Discharge.
		Feet.	*Sec.-ft.*
June 19	E. O. Christiansen	4.87	500
30	R. H. Fletcher	3.50	263
July 19	.....do	3.50	276
Oct. 17	G. H. Russell	2.19	36.5

Daily gage height, in feet, of Little Popo Agie River at Hudson, Wyo., for 1911.

[L. D. Ladd, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	3.60	2.05	1.80	2.0	2.27	16	......	2.50	1.90	1.80	2.10	......
2	......	3.30	2.02	1.78	2.08	2.32	17	......	2.50	1.90	1.80	2.17	......
3	......	3.15	2.00	1.75	2.10	2.32	18	......	2.50	1.90	1.75	2.19	......
4	......	3.10	2.00	1.75	2.10	2.32	19	4.87	3.05	1.90	1.78	2.19	......
5	......	3.10	1.98	1.85	2.05	2.32	20	4.90	2.80	1.85	1.80	2.17	......
6	......	3.10	2.02	1.92	2.15	2.29	21	5.40	2.60	1.85	1.80	2.17	......
7	......	3.00	2.05	1.95	2.15	2.25	22	5.70	2.60	1.85	1.80	2.17	......
8	......	3.00	2.10	2.00	2.10	2.27	23	4.80	2.50	1.85	1.90	2.32	......
9	......	2.90	2.05	2.00	2.15	2.29	24	4.40	2.50	1.85	1.80	2.29	......
10	......	2.80	2.00	1.98	2.15	2.45	25	4.10	2.42	1.85	1.80	2.29	......
11	......	2.65	2.02	1.85	2.15	2.47	26	3.70	2.32	1.85	1.82	2.29	......
12	......	2.60	2.02	1.85	2.12	......	27	3.60	2.30	1.85	1.90	2.32	......
13	......	2.50	2.00	1.80	2.18	......	28	3.60	2.28	1.85	1.95	2.27	......
14	......	2.50	2.00	1.80	2.15	......	29	3.50	2.22	1.85	2.05	2.27	......
15	......	2.50	2.00	1.80	2.15	......	30	3.50	2.15	1.85	2.00	2.32	......
							31	......	2.08	1.85	......	2.29	......

OWL CREEK NEAR THERMOPOLIS, WYO.

Location.—At a highway bridge about 5 miles northwest of Thermopolis, Wyo., near the ranch buildings of the observer, C. H. McCumber.

Records available.—July 30, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—A staff fastened to upstream side of bridge.

Channel.—Probably shifting.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—Water is diverted from Owl Creek for irrigation and practically all the low-water flow is appropriated.

Discharge measurements of Owl Creek near Thermopolis, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 23[a]	W. A. Lamb	1.38	1.05
June 23	R. Richards	2.83	160
Aug. 1	B. E. Jones	1.66	5.5
Oct. 28	.....do	[b]1.67	0.5

[a] Float measurement.

[b] Ice conditions.

Daily discharge, in second-feet, of Owl Creek near Thermopolis, Wyo., for 1910.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		10	1.5	4.0	6.5	6.5	16		1.5	2.5	2.5	6.5	
2		2.5	1.5	6.5	6.5	6.5	17		1.5	2.5	2.5	6.5	
3		2.5	1.5	6.5	6.5	6.5	18		.5	2.5	2.5	6.5	
4		1.5	1.5	6.5	6.5	6.5	19		.5	2.5	2.5	6.5	
5		1.5	1.5	6.5	6.5	6.5			.5	2.5	2.5	6.5	
							20						
6		1.5	2.5	6.5	6.5		21		.5	2.5	2.5	6.5	
7		1.5	2.5	6.5	6.5		22		.5	142	2.5	6.5	
8		1.5	6.5	6.5	6.5		23		.5	76	2.5	6.5	
9		1.5	6.5	4.0	6.5		24		.5	197	2.5	6.5	
10		1.5	6.5	3.2	6.5		25		.5	131	2.5	6.5	
11		1.5	6.5	2.5	6.5		26		.5	10	2.5	6.5	
12		1.5	6.5	2.5	6.5		27		.5	6.5	6.5	6.5	
13		1.5	6.5	2.5	6.5		28		.5	6.5	6.5	6.5	
14		1.5	6.5	2.5	6.5		29		.5	4.0	6.5	6.5	
15		1.5	6.5	2.5	6.5		30	6.5	.5	4.0	6.5	6.5	
							31	34	.5		6.5		

NOTE.—Gage heights after Oct. 26, 1910, distorted by ice.

Daily gage height, in feet, of Owl Creek near Thermopolis, Wyo., for 1911.

[C. H. McCumber, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		1.7	1.5	1.5	2.0	1.6	1.4	1.5
2		1.7	1.5	1.75	2.0	1.6	1.4	1.5
3		1.7	1.5	2.2	2.0	1.6	1.4	1.6
4		1.5	1.5	2.45	1.9	1.7	1.4	1.6
5		1.5	1.5	2.6	1.9	1.7	1.4	1.6
6		1.5	1.5	2.55	1.8	1.7	1.4	1.6
7		1.5	1.5	2.6	1.9	2.0	1.5	1.6
8		1.5	1.5	2.55	1.7	1.8	1.5	1.6
9		1.5	1.7	2.55	1.7	1.7	1.4	1.5
10		1.5	1.7	2.55	1.8	1.6	1.4	1.5
11		1.5	1.7	2.7	1.7	1.6	1.4	1.5
12	2.0	1.5	1.5	2.8	1.6	1.6	1.4	1.5
13	2.0	1.5	1.5	2.85	1.6	1.6	1.4	1.5
14	2.1	1.5	1.6	2.9	1.6	1.5	1.4	1.5
15	2.1	1.5	1.6	3.0	1.6	1.5	1.4	1.5
16	2.1	1.7	1.6		1.7	1.5	1.4	1.5
17	2.1	1.7	1.5		1.7	1.4	1.4	1.5
18	2.2	1.7	1.5		1.9	1.4	1.4	1.5
19	2.1	1.7	1.5		2.0	1.4	1.4	1.5
20	2.1	1.7	1.5		1.9	1.4	1.4	1.5
21	2.0	1.7	1.5		1.8	1.4	1.4	1.6
22	2.0	1.7	1.4	2.83	1.7	1.4	1.4	1.6
23	2.0	1.5	1.4	2.9	1.7	1.4	1.4	1.6
24	1.9	1.5	1.4	2.85	1.7	1.4	1.4	1.6
25	1.8	1.5	1.4	2.7	1.7	1.4	1.4	1.6
26	1.8	1.5	1.4	2.55	1.6	1.4	1.5	1.6
27	1.8	1.5	1.6	2.4	1.6	1.4	1.5	1.6
28	1.8	1.5	1.5	2.4	1.5	1.4	1.5	1.65
29	1.7	1.5	1.4	2.3	1.5	1.4	1.5	1.65
30	1.7	1.5	1.4	2.1	1.5	1.4	1.5	1.6
31	1.7		1.5		1.5	1.4		1.6

NOTE.—Gage heights, Oct. 21-31, 1911, distorted by ice.

Daily discharge, in second-feet, of Owl Creek near Thermopolis, Wyo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		6.5	2.5	2.5	24	4.0	1.5	2.5
2		6.5	2.5	8.2	24	4.0	1.5	2.5
3		6.5	2.5	46	24	4.0	1.5	4.0
4		2.5	2.5	84	16	6.5	1.5	4.0
5		2.5	2.5	111	16	6.5	1.5	4.0
6		2.5	2.5	102	10	6.5	1.5	4.0
7		2.5	2.5	111	16	24	2.5	4.0
8		2.5	2.5	102	6.5	10	2.5	4.0
9		2.5	6.5	102	6.5	6.5	1.5	2.5
10		2.5	6.5	102	10	4.0	1.5	2.5
11		2.5	6.5	131	6.5	4.0	1.5	2.5
12	24	2.5	2.5	153	4.0	4.0	1.5	2.5
13	24	2.5	2.5	164	4.0	4.0	1.5	2.5
14	34	2.5	4.0	175	4.0	2.5	1.5	2.5
15	34	2.5	4.0	197	4.0	2.5	1.5	2.5
16	34	6.5	4.0	190	6.5	2.5	1.5	2.5
17	34	6.5	2.5	190	6.5	1.5	1.5	2.5
18	46	6.5	2.5	190	16	1.5	1.5	2.5
19	34	6.5	2.5	190	24	1.5	1.5	2.5
20	34	6.5	2.5	180	16	1.5	1.5	2.5
21	24	6.5	2.5	170	10	1.5	1.5	
22	24	6.5	1.5	160	6.5	1.5	1.5	
23	24	2.5	1.5	175	6.5	1.5	1.5	
24	16	2.5	1.5	164	6.5	1.5	1.5	
25	10	2.5	1.5	131	6.5	1.5	1.5	
26	10	2.5	1.5	102	4.0	1.5	2.5	
27	10	2.5	4.0	76	4.0	1.5	2.5	
28	10	2.5	2.5	76	2.5	1.5	2.5	
29	6.5	2.5	1.5	60	2.5	1.5	2.5	
30	6.5	2.5	1.5	34	2.5	1.5	2.5	
31	6.5		2.5		2.5	1.5		

NOTE.—Determination of daily discharge for 1910 has been revised by measurements made during 1911. Daily discharge determined from a rating curve fairly well defined between 0 and 10 second-feet. Discharge interpolated June 16 to 21.

Monthly discharge of Owl Creek near Thermopolis, Wyo., for 1910–11.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
• 1910.					
August	10	•0.5	1.39	855	C.
September	197	1.5	21.9	1,300	C.
October	6.5	2.5	4.10	256	C.
1911.					
March	46	6.5	18.6	1,140	C.
April	6.5	2.5	3.83	228	C.
May	6.5	1.5	2.85	175	C.
June	197	2.5	123	7,320	D.
July	24	2.5	9.63	592	C.
August	24	1.5	3.81	234	C.
September	2.5	1.5	1.73	103	C.
October	4.0		2.44	150	C.
The period			14.7	9,940	

NOTE.—Discharge Oct. 27–31, 1910, estimated at 2.5 second-feet, Mar. 1 to 11, 1911, at 12 second-feet, and Oct. 21–31 at 1.5 second-feet.

NO WOOD RIVER AT BONANZA, WYO.

Location.—In the SW. ¼ SW. ¼ sec. 13, T. 49 N., R. 91 W., near the ranch of J. W. Graves, one-fourth mile north of Bonanza post office.

Records available.—July 29, 1910, to November 30, 1911.

Drainage area.—Not measured.

Gage.—Chain gage on left bank near public highway.

Channel.—Sand and gravel.

Discharge measurements.—Made by wading 50 feet below the gage; in flood, from the public highway bridge one-half mile below.

Winter flow.—Affected by ice.

Diversions.—Irrigation is carried on to some extent and water is diverted both above and below the station.

Discharge measurements of No Wood River at Bonanza, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 20	W. A. Lamb	3.18	473
June 25	R. Richards	3.26	542
Aug. 4	B. E. Jones	2.14	109
Oct. 30	.....do	2.35	175

Daily gage height, in feet, of No Wood River at Bonanza, Wyo., for 1911.

[Grace E. Taylor, observer.]

Day.	Mar.	Apr.	May.	June.	Aug.	Sept.	Oct.	Nov.
1		2.20	2.45	4.80		1.80	2.28	2.42
2		2.22		5.20		1.80	2.30	2.35
3		2.32		4.60		1.85	2.32	2.35
4		2.32	2.28	4.40	2.15	1.90	2.32	2.35
5		2.40	2.25	4.40	2.35	1.95	2.33	2.38
6		2.41	2.26	4.20	2.28	2.00	2.34	2.41
7		2.31	2.90	4.20	2.40	2.00	2.32	2.38
8			3.20	4.40	2.65	2.00	2.31	2.35
9		2.22	3.70	4.50	2.30	2.00	2.30	2.32
10		2.24	3.60	3.80	2.20	2.00	2.30	2.55
11		2.24	3.30	3.80	2.10	2.00	2.30	2.55
12		2.20	3.20		2.10	2.00	2.30	2.52
13		2.28	3.00	4.40	2.00	2.00	2.28	2.68
14		2.20	3.15		2.00	2.00	2.28	2.80
15			4.00	5.20	2.00	2.00	2.35	2.95
16		1.70	4.90	5.70	1.90	2.00	2.38	2.98
17		2.13	4.20	5.20	1.90	2.05	2.38	3.00
18		2.14			1.90	2.05	2.64	3.00
19	2.36	2.14	3.50		1.85	2.05	2.40	2.98
20	2.36	2.12	3.20		1.80	2.05	2.36	2.95
21	2.35	2.14	3.05		1.80	2.10	2.30	
22	2.44	2.24			1.75	2.10	2.35	
23	2.40				1.80	2.10	2.40	
24	2.32				1.80	2.10	2.35	
25	2.30		3.80	3.26	1.85	2.15	2.38	
26	2.35				1.85	2.20	2.40	
27	2.30		4.00		1.80	2.20	2.35	
28	2.23		3.50		1.80	2.25	2.36	
29	2.20		3.30		1.85	2.20	2.36	
30	2.20	2.55	3.60		1.80	2.25	2.34	
31					1.75		2.35	

NOTE.—Gage heights after Nov. 9 distorted by ice.

Daily discharge, in second-feet, of No Wood River at Bonanza, Wyo., for 1911.

Day.	Mar.	Apr.	May.	June.	Aug.	Sept.	Oct.	Nov.
1	....	125	198	1,280	100	50	145	187
2	....	130	180	1,480	100	50	150	165
3	....	156	162	1,180	100	58	156	165
4	....	156	145	1,080	112	65	156	165
5	....	180	138	1,080	165	73	159	174
6	....	184	140	980	145	80	162	184
7	....	153	365	980	180	80	156	174
8	....	142	495	1,080	268	80	153	165
9	....	130	730	1,130	150	80	150	156
10	....	135	680	780	125	80	150	....
11	....	135	540	780	100	80	150	....
12	....	125	495	930	100	80	150	....
13	....	145	405	1,080	80	80	145	....
14	....	125	472	1,280	80	80	145	....
15	....	82	880	1,480	80	80	165	....
16	....	40	1,330	1,730	65	80	174	....
17	....	108	980	1,480	65	90	174	....
18	....	110	805	1,360	65	90	264	....
19	168	110	630	1,240	58	90	180	....
20	168	105	495	1,120	50	90	168	....
21	165	110	428	1,000	50	100	150	....
22	194	135	516	880	45	100	165	....
23	180	147	604	760	50	100	180	....
24	156	159	692	640	50	100	165	....
25	150	171	780	522	58	112	174	....
26	165	183	830	....	58	125	180	....
27	150	195	880	....	50	125	165	....
28	132	207	630	....	50	138	168	....
29	125	219	540	....	58	125	168	....
30	125	232	680	....	50	138	162	....
31	125	....	980	....	45	....	165	....

NOTE.—Daily discharge determined from a rating curve well defined below 600 second-feet; discharg interpolated for days for which gage heights are missing.

Monthly dicharge of No Wood River at Bonanza, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 19-31	194	125	154	3,970	B.
April	232	40	144	8,570	B.
May	1,330	138	575	35,400	C.
June	1,730	....	994	59,100	C.
August	268	45	88.8	5,460	B.
September	138	50	90.0	5,360	B.
October	264	145	164	10,100	B.
November 1 to 9	....	....	171	3,050	B.

NOTE.—Discharge June 26 to 30, estimated at 500 second-feet.

TENSLEEP CREEK NEAR TENSLEEP, WYO.

Location.—In NW. ¼ NW. ¼ sec. 12, T. 47 N., R. 88 W., 5 miles from Tensleep post office and 800 feet east of the county bridge, on Burke's ranch, located by a cliff 80 feet high on north side of creek; just below mouth of Canyon Fork, the principal tributary.

Records available.—September 21, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Inclined and upright staff.

Channel.—Rocky ledge.

Discharge measurements.—At low and ordinary stages made by wading; at flood stages made from the bridges over Canyon Fork and Tensleep Creek.

Winter flow.—Ice will not form at this station except in extremely cold weather.

Diversions.—A small amount of water is diverted from this stream for irrigation.

Discharge measurements of Tensleep Creek near Tensleep, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 21	W. A. Lamb	0.99	193
June 24[a]	R. Richards	1.20	263
Aug. 4	B. E. Jones	0.38	89
Oct. 31	.....do	0.00	45

[a] Measurement made from wagon bridges over Ten Sleep and Canyon Fork Creeks

Daily gage height, in feet, of Tensleep Creek near Tensleep, Wyo., for 1911.

[Bessie Burke, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.1	0.35	3.05	1.0	0.25	0.0	0.15	0.0	0.05
2		.2	.3	2.75	.9	.25	.0	.15	.0	.05
3		.2	.3	2.2	.85	.25	.0	.15	.0	.05
4		.1	.3	2.3	.75	.35	.0	.2	.0	.0
5		.1	.5	2.7	.65	.4	.05	.2	.0	.05
6		.0	1.05	2.5	.65	.35	.1	.15	.05	.05
7		.0	.95	2.15	.6	.35	.05	.15	.05	.05
8		.0	1.05	2.1	.55	.35	.05	.1	.05	.0
9		0.5	1.0	2.0	.55	.35	.0	.15	.0	.05
10		0.5	1.0	1.7	.5	.3	.0	.15	.0	.05
11	0.05	.0	.95	2.2	.5	.35	.0	.1	.0	.0
12	.0	.0	.9	2.3	.45	.35	.0	.1	.0	.0
13	.0	.0	1.1	2.4	.4	.3	.1	.1	.05	.0
14	.0	.0	1.25	2.8	.3	.35	.1	.15	.05	.0
15	.0	.0	2.25	2.85	.3	.2	.05	.15	.15	.0
16	.0	.0	2.25	2.8	.4	.2	.05	.15	.15	.0
17	.0	.0	1.95	2.45	.45	.1	.1	.15	.1	.0
18	.0	.0	1.65	2.4	.6	.1	.05	.15	.1	.0
19	.0	.0	1.15	2.2	.55	.1	.1	.1	.05	.0
20	.0	.05	1.0	2.15	.4	.05	.05	.05	.1	.0
21	.0	.05	1.0	1.9	.5	.05	.05	.1	.1	.0
22	.0	.1	1.1	1.65	.4	.05	.05	.1	.1	.05
23	.0	.05	1.15	1.4	.3	.05	.05	.1	.05	.0
24	.0	.05	1.6	1.25	.3	.05	.05	.1	.05	.0
25	.0	.1	1.9	1.15	.25	.05	.05	.1	.05	.0
26	.0	.15	2.3	1.0	.25	.0	.05	.05	.05	.0
27	.0	.4	1.6	.9	.25	.05	.05	.05	.05	.0
28	.0	.4	1.3	.8	.25	.05	.1	.05	.05	.0
29	.0	.45	1.15	.75	.3	.0	.05	.05	.0	.0
30	.05	.35	1.75	.65	.3	.05	.05	.0	.05	.0
31	.10		2.1		.25	.0		.0		.05

Daily discharge, in second-feet, of Tensleep Creek near Tensleep, Wyo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	55	82	940	195	70	45	60	45	50
2	....	65	76	820	170	70	45	60	45	50
3	....	65	76	600	160	70	45	60	45	50
4	....	55	76	640	140	82	45	65	45	45
5	....	55	101	800	123	88	50	65	45	50
6	....	45	210	720	123	82	55	60	50	50
7	....	45	182	580	115	82	50	60	50	50
8	....	45	210	560	108	82	50	55	50	45
9	....	50	195	525	108	82	45	60	45	50
10	....	50	195	420	101	76	45	60	45	50
11	50	45	182	600	101	82	45	55	45	45
12	45	45	170	640	94	82	45	55	45	45
13	45	45	225	680	88	76	55	55	50	45
14	45	45	270	840	76	82	55	60	50	45
15	45	45	620	860	76	65	50	60	60	45
16	45	45	620	840	88	65	50	60	60	45
17	45	45	508	700	94	55	55	60	55	45
18	45	45	402	680	115	55	50	60	55	45
19	45	45	240	600	108	55	55	55	50	45
20	45	50	195	580	88	50	50	50	55	45
21	45	50	195	490	101	50	50	55	55	45
22	45	55	225	402	88	50	50	55	55	50
23	45	50	240	315	76	50	50	55	50	45
24	45	50	385	270	76	50	50	55	50	45
25	45	55	490	240	70	50	50	55	50	45
26	45	60	640	195	70	45	50	50	50	45
27	45	88	385	170	70	50	50	50	50	45
28	45	88	285	149	70	50	55	50	50	45
29	45	94	240	140	76	45	50	50	45	45
30	50	82	438	123	76	50	50	45	50	45
31	55	....	560	....	70	45	....	45	....	50

NOTE.—Daily discharge determined from a fairly well-defined rating curve. Discharge estimated Mar. 1 to 10, 50 second-feet.

Monthly discharge of Tensleep Creek near Tensleep, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	50	3,070	D.
February	....	....	50	2,780	D.
March	55	45	47.3	2,910	C.
April	94	45	55.2	3,280	B.
May	640	76	288	17,700	B.
June	940	123	537	32,000	B.
July	195	70	105	6,460	B.
August	88	45	64.1	3,940	B.
September	55	45	51.3	3,050	B.
October	65	45	56.1	3,450	B.
November	60	45	49.8	2,960	B.
December	50	45	46.6	2,870	B.
The year	940	....	116	84,500	

NOTE.—Means for January and February estimated.

PAINT ROCK CREEK NEAR HYATTVILLE, WYO.

Location.—In the Bighorn National Forest in the NW. ¼ sec. 18, T. 50 N., R. 88 W., 1½ miles southeast of the Longview ranger station and about 12 miles east of Hyattville; 400 yards below the mouth of the North Fork, the nearest tributary.

Records available.—October 28 to December 31, 1911.

Drainage area.—81 square miles (measured from topographic sheet).

Gage.—Vertical staff.

Channel.—Probably permanent.

Discharge measurements.—Made by wading.

Winter flow.—No data.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Paint Rock Creek amounting to 54 second-feet. Practically all the water is diverted below the station.

Accuracy.—Sufficient data to determine accuracy have not been obtained.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. B. Waha on October 28, 1911: Gage height, 0.80 foot; discharge, 26 second-feet.

The following additional gage heights were observed at this station: November 3, 1.10 feet; December 23, 0.15 foot.

PAINT ROCK CREEK NEAR BONANZA, WYO.

Location.—In the SE. ¼ NE. ¼ sec. 19, T. 49 N., R. 90 W., near the farmhouse of William Paumer, 1½ miles from Bonanza post office and 12 miles from Manderson, Wyo.; about 1½ miles above junction with No Wood River.

Records available.—July 28, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain gage on the right bank of the stream, directly in front of the house of the observer.

Channel.—Bed of stream rocky and clean, probably nonshifting.

Discharge measurements.—Made by wading at the gage at low and ordinary stages, and from the highway bridge, one-fourth mile below, in flood.

Winter flow.—Ice common at gaging station.

Diversions.—Water for irrigation is diverted above the station.

Discharge measurements of Paint Rock Creek near Bonanza, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 20	W. A. Lamb	3.47	173
June 25	R. Richards	3.77	289
Aug. 4	B. E. Jones	2.91	64
Oct. 30	.....do	2.85	61

Daily gage height, in feet, of Paint Rock Creek near Bonanza, Wyo., for 1911.

[V. Paumer, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2.57	2.48	5.45	3.30	2.62	2.24	2.81	2.80
2	....	2.57	2.48	5.60	3.40	2.63	2.20	2.84	2.80
3	....	2.61	2.41	4.90	3.20	2.72	2.22	2.90	2.74
4	....	2.61	2.38	5.00	3.10	2.94	2.22	2.92	2.91
5	....	2.67	2.29	5.35	3.10	3.00	2.24	2.91	2.91
6	....	2.67	3.25	4.80	3.10	3.00	2.31	2.94	2.84
7	....	2.59	3.30	4.75	3.05	3.25	2.32	3.00	2.80
8	....	2.60	3.90	5.00	3.00	3.10	2.34	2.92	2.80
9	....	2.39	4.40	4.70	2.91	3.00	2.34	2.92	2.81
10	....	2.39	4.35	4.40	2.90	2.81	2.34	2.84	....
11	....	2.41	3.90	4.30	2.73	2.71	2.41	2.92	....
12	....	2.49	3.40	4.90	2.63	2.64	2.42	2.81	....
13	2.67	2.49	3.40	5.10	2.53	2.52	2.42	2.81	....
14	2.67	2.47	3.70	5.10	2.51	2.54	2.52	2.73	....
15	2.61	2.41	4.30	5.10	2.50	2.51	2.52	2.91	....
16	2.60	2.37	5.10	5.60	2.44	2.44	2.52	2.82	....
17	2.68	2.37	4.60	5.10	2.52	2.42	2.54	2.82	....
18	2.59	2.38	4.30	4.50	2.62	2.40	2.61	2.90	....
19	2.59	2.31	4.05	4.6	2.73	2.41	2.61	2.82	....
20	2.59	2.31	3.60	4.85	2.80	2.34	2.52	2.84	....
21	2.60	2.39	3.40	4.50	2.92	2.31	2.52	2.80	....
22	2.60	2.39	3.45	4.30	2.80	2.31	2.54	2.82	....
23	2.59	2.31	3.80	4.10	2.74	2.34	2.54	2.80	....
24	2.59	2.31	3.80	4.00	2.72	2.40	2.60	2.94	....
25	2.59	2.29	4.30	3.80	2.64	2.32	2.61	2.92	....
26	2.59	2.27	5.00	3.55	2.62	2.30	2.70	2.92	....
27	2.58	2.19	4.40	3.45	2.52	2.31	2.71	2.80	....
28	2.51	2.27	3.90	3.30	2.51	2.34	2.71	2.90	....
29	2.57	2.28	3.70	3.30	2.42	2.40	2.74	2.82	....
30	2.51	2.48	4.10	3.20	2.44	2.31	2.81	2.81	....
31	2.51	....	4.65	....	2.51	2.30	....	2.81	....

Daily discharge, in second-feet, of Paint Rock Creek near Bonanza, Wyo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	31	24	890	140	35	11	54	53
2	....	31	24	950	165	36	10	58	53
3	....	34	19	670	120	44	11	66	46
4	....	34	17	710	100	72	11	69	68
5	....	39	13	850	100	82	11	67	68
6	....	39	130	630	100	82	14	72	58
7	....	32	140	612	91	130	14	82	53
8	....	33	280	710	82	100	15	69	53
9	....	17	490	595	68	82	15	69	54
10	....	17	472	490	66	54	15	58	....
11	....	19	315	455	45	43	19	69	....
12	....	24	165	670	36	37	19	54	....
13	39	24	165	750	14	27	19	54	....
14	39	23	250	750	26	28	27	45	....
15	34	19	455	750	25	26	27	67	....
16	33	16	750	950	21	21	27	56	....
17	40	16	560	750	27	19	28	56	....
18	32	17	455	525	35	18	34	66	....
19	32	13	368	560	45	19	34	56	....
20	32	13	220	650	53	15	27	58	....
21	33	17	165	525	69	14	27	53	....
22	33	17	178	455	53	14	28	56	....
23	32	13	280	385	46	15	28	53	....
24	32	13	280	350	44	18	33	72	....
25	32	13	455	208	37	14	34	69	....
26	32	12	710	205	35	13	42	69	....
27	31	10	490	178	27	14	43	53	....
28	26	12	315	140	26	15	43	66	....
29	31	12	250	140	19	18	46	56	....
30	26	24	385	120	21	14	54	54	....
31	26	....	578	....	26	13	....	54	....

NOTE.—Daily discharge determined from a rating curve fairly well defined. Daily discharge Mar. 1 to 12 estimated at 40 second-feet; Nov. 10 to 30, discharge estimated at 50 second-feet.

Monthly discharge of Paint Rock Creek near Bonanza, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			40	2,460	D.
February			40	2,220	D.
March			35.3	2,170	C.
April	39	10	21.1	1,260	B.
May	750	13	303	18,600	B.
June	950	120	556	33,100	B.
July	165	14	56.8	3,490	B.
August	130	13	36.5	2,240	B.
September	54	10	25.5	1,520	B.
October	82	45	61.3	3,770	B.
November	68		51.9	3,090	C.
December			35	2,150	D.
The year	950		105	76,100	

NOTE.—Means January, February, and December estimated.

GREYBULL RIVER NEAR MEETEETSE, WYO.

Location.—In the NW. ¼ SE. ¼ sec. 15, T. 48 N., R. 101 W., 300 feet from Wilson's house, about 5 miles from Meeteetse, Wyo., on the road to Sunshine & Wilson's mine.

Records available.—September 14, 1910, to December 31, 1910.

Drainage area.—Not measured.

Gage.—Staff gage fastened to south span of the middle pier on the upstream side of the bridge; datum unchanged.

Channel.—Bed of stream rocky.

Discharge measurements.—At flood stage made from the upstream side of the bridge; low-water measurements are made by wading either above or below the bridge.

Diversions.—Irrigation is carried on extensively by water diverted from this stream and its tributaries.

Discharge measurements of Greybull River near Meeteetse, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 26	W. A. Lamb	1.80	382
June 27	R. Richards	2.55	1,070
Aug. 6	B. E. Jones	1.33	366
7	.....do	1.33	361
Nov. 3	.....do	0.83	146

Daily gage height, in feet, and discharge, in second-feet, of Greybull River near Meeteetse, Wyo., for 1910.

[Katherine Wilson, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			0.98	185	0.98	185	0.85	156
2			1.01	193	.96	180	.85	156
3			1.02	195	.94	176	.83	151
4			.98	185	.86	158	.82	149
5			.97	183	.78	141	.79	143
6			1.06	206	.96	180	.75	135
7			1.03	198	.91	168	.76	138
8			.99	188	.86	158	.82	149
9			.97	183	.79	143	.85	156
10			.97	183	.89	164	.88	162
11			.97	183	.87	160	.85	156
12			.97	183	.84	153	.86	158
13			.96	180	.82	149	.88	162
14	0.68	124	.97	183	.74	134	.90	166
15	.68	124	.97	183	.72	131	.94	176
16	.81	147	.96	180	.70	127	.96	180
17	1.30	280	1.01	193	.78	141	1.04	
18	.86	158	.99	188	.85	156	1.65	
19	.98	185	.97	183	.88	162	1.78	
20	.85	156	.78	141	.69	126	.98	
21	.88	162	.89	164	.75	136	.98	
22	2.34	889	.86	158	.70	127	3.00	
23	1.27	270	.90	166	.88	162	3.00	
24	1.06	206	.88	162	.85	156	2.68	
25	.98	185	.89	164	.80	145	3.00	
26	1.07	209	.99	188	.85	156		
27	1.07	209	.92	171	.65	120		
28	1.04	201	.98	185	.68	124		
29	.98	185	1.02	195	.85	156		
30	.98	185	1.00	190	.88	162		
31			.96	180				

NOTE.—Gage heights Mar. 12 to 14 and after Dec. 16, distorted by ice.

Daily gage height, in feet, of Greybull River near Meeteetse, Wyo., for 1911.

[Katherine Wilson, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.74	0.89	1.55	2.30	1.50	0.94	0.94	0.83	0.84
2		.74	.98	1.65	2.15	1.50	.96	.92	.84	.84
3		.74	.98	1.45	2.20	1.45	.96	.92	.83	.84
4		.76	.96	1.90	2.25	1.45	.95	.90	.86	.84
5		.76	.98	2.85	2.30	1.35	.97	.88	.88	
6		.75	1.65	2.90	2.30	1.38	.98	.88	.86	
7		.74	1.60	3.05	2.50	1.30	1.00	.88	.83	
8		.74	1.60	3.20	2.55	1.35	.98	.86	.82	
9		.76	1.95	3.00	2.00	1.35	.97	.86	.82	
10		.78	1.55	2.90	1.90	1.30	.96	.87	.82	
11		.76	1.55	2.95	1.90	1.30	.95	.86	.82	
12	1.25	.72	1.50	3.40	1.85	1.25	.97	.86	.82	
13	1.40	.65	1.50	4.85	1.85	1.20	.96	.86	.83	
14	1.60	.57	1.60	3.80	1.85	1.20	.96	.86	.86	
15	.98	.54	2.65	4.15	1.90	1.20	.96	.87	.86	
16	.85	.60	1.95	3.85	1.90	1.20	.95	.87	.86	
17	.88	.62	1.70	3.75	2.05	1.15	.97	.87	.86	
18	.88	.65	1.45	4.05	2.00	1.10	.96	.87	.88	
19	.94	.68	1.30	3.55	1.95	1.00	.96	.84	.90	
20	1.00	.71	1.25	3.50	2.80	.98	.95	.84	.94	
21	.98	.76	1.20	3.40	2.00	.98	.95	.86	.94	
22	.84	.73	1.65	3.20	2.05	.95	.96	.90	.96	
23	.85	.78	1.45	2.95	1.95	.95	.96	.88	.96	
24	.88	.75	1.90	2.90	1.80	.95	.97	.86	.96	
25	.76	.78	1.95	2.75	1.75	.92	.97	.84	.94	
26	.75	.81	2.05	2.55	1.70	.90	.96	.83	.94	
27	.68	1.00	1.85	2.50	1.70	.92	.95	.83	.88	
28	.65	.92	1.65	2.55	1.70	.94	.95	.84	.86	
29	.72	.96	1.85	2.50	1.65	.94	.94	.84	.86	
30	.72	.96	1.95	2.65	1.55	.92	.94	.83	.84	
31	.74		2.05		1.50	.90		.83		

Daily discharge, in second-feet, of Greybull River near Meeteetse, Wyo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		134	164	378	855	355	176	176	151	153
2		134	185	425	732	355	180	171	153	153
3		134	185	336	770	336	180	171	151	153
4		138	180	565	812	336	178	166	158	153
5		138	185	1,340	855	298	183	162	162	
6		136	425	1,390	855	309	185	162	158	
7		134	400	1,520	1,030	280	190	162	151	
8		134	400	1,660	1,080	298	185	158	149	
9		138	595	1,480	625	298	183	158	149	
10		141	378	1,390	565	280	180	160	149	
11		138	378	1,440	565	280	178	158	149	
12		131	355	1,840	535	264	183	158	149	
13		120	355	3,140	535	247	180	158	151	
14		108	400	2,200	535	247	180	158	158	
15	185	105	1,160	2,520	565	247	180	160	158	
16	156	112	595	2,240	565	247	178	160	158	
17	162	115	450	2,160	660	232	183	160	158	
18	162	120	336	2,420	625	217	180	160	162	
19	176	124	280	1,980	595	190	180	153	166	
20	190	129	264	1,930	1,300	185	178	153	176	
21	185	138	247	1,840	625	185	178	158	176	
22	153	132	425	1,660	660	178	180	166	180	
23	156	141	336	1,440	595	178	180	162	180	
24	162	136	565	1,390	505	178	183	158	180	
25	138	141	595	1,260	472	171	183	153	176	
26	136	147	660	1,080	450	166	180	151	176	
27	124	190	535	1,030	450	171	178	151	162	
28	120	171	425	1,080	450	176	178	153	158	
29	131	180	535	1,030	425	176	176	153	158	
30	131	180	595	1,160	378	171	176	151	153	
31	134		660		355	166		151		

NOTE.—Daily discharge for 1910 and 1911 determined from a poorly defined rating curve.

Monthly discharge of Greybull River near Meeteetse, Wyo., for 1910–11.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1910.					
September 14–30	889	124	228	7,690	C.
October	206	141	181	11,100	C.
November	185	120	151	8,990	C.
December	180	135	158	9,720	D.
1911.					
January			150	9,220	
February			140	7,780	
March	190	120	152	9,350	D.
April	190	105	137	8,150	C.
May	1,160	164	427	26,300	C.
June	3,140	336	1,510	89,800	C.
July	1,300	355	646	39,700	C.
August	355	166	239	14,700	C.
September	190	176	180	10,700	C.
October	176	151	159	9,780	C.
November	180	149	160	9,520	C.
December			140	8,600	
The year				244,000	

NOTE.—Discharge Dec. 17 to 31, 1910, estimated at 160 second-feet. Means for January, February, and December, 1911, estimated. Discharge Mar. 1 to 14, 1911, estimated at 150 second-feet.

WOOD RIVER NEAR MEETEETSE, WYO.

Location.—In the SE. ¼ sec. 22, T. 48 N., R. 101 W., on the highway bridge 800 feet above the junction of Wood and Meeteetse rivers, 9 miles from Meeteetse post office, on the road running west to the Pitchfork ranch.

Records available.—September 15, 1910, to December 31, 1911.

Gage.—Staff fastened to the wind brace on the north side of the bridge.

Channel.—Bed of stream, gravel.

Discharge measurements.—Made from the downstream side of bridge.

Winter flow.—Ice present during winter months.

Diversions.—A few ditches, all above the station, divert water from this stream.

Discharge measurements of Wood River near Meeteetse, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 26	W. A. Lamb	1.05	127
June 27	R. Richards	1.74	323
Aug. 6	B. E. Jones	1.24	148
Nov. 3	....do	1.03	86
3	....do	1.03	85

Daily gage height, in feet, and discharge, in second-feet, of Wood River near Meeteetse, Wyo., for 1910.

[Guinevere Irwin, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			0.80	68	0.75	58	0.72	53
2			.85	79	.75	58	.70	49
3			.82	72	.75	58	.70	49
4			.81	70	.74	57	.70	49
5			.80	68	.74	57	.70	49
6			.81	70	.73	55	.70	49
7			.81	70	.73	55	.70	49
8			.78	64	.73	55	.70	49
9			.75	58	.72	53	.70	49
10			.75	58	.72	53	.70	49
11			.75	58	.73	55		
12			.74	57	.72	53		
13			.74	57	.72	53		
14			.73	55	.71	51		
15	0.78	64	.73	55	.71	51		
16	.82	72	.72	53	.71	51		
17	.85	79	.71	51	.71	51		
18	.84	77	.73	55	.71	51		
19	.84	77	.72	53	.72	53		
20	.85	79	.70	49	.73	55		
21	.84	77	.70	49	.71	51		
22	.95	102	.70	49	.72	53		
23	.90	90	.68	46	.72	53		
24	.85	79	.67	44	.70	49		
25	.85	79	.69	47	.70	49		
26	.84	77	.72	53	.71	51		
27	.80	68	.77	62	.71	51		
28	.78	64	.80	68	.75	58		
29	.80	68	.77	62	.75	58		
30	.78	64	.75	58	.75	58		
31			.77	62				

Daily gage height, in feet, of Wood River near Meeteetse, Wyo., for 1911.

[Guinevere Irwin, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	0.65	0.65	1.09	1.48	1.26	1.00	0.72	1.03
2	....	.65	.70	1.11	1.48	1.26	1.00	.89	1.04
3	....	.65	.68	1.09	1.46	1.21	1.00	.84	1.04
4	....	.60	.70	1.14	1.43	1.22	1.00	.86	1.03
5	....	.62	.76	1.19	1.48	1.21	1.02	.89	1.03
6	....	.61	.80	1.24	1.43	1.21	.99	.90	1.01
7	....	.64	.85	1.23	1.48	1.16	1.00	.89	1.01
8	....	.66	.85	1.24	1.48	1.16	1.00	.88	1.04
9	....	.60	.92	1.49	1.38	1.16	.95	.89	.99
10	....	.61	.86	1.09	1.28	1.16	.99	.88	.99
11	....	.61	.82	1.29	1.23	1.16	.98	.86	1.01
12	....	.60	.80	1.34	1.20	1.16	.97	.88	1.39
13	....	.59	.80	1.49	1.18	1.14	.99	.86	1.39
14	....	.65	.85	1.44	1.23	1.06	.95	.86	1.41
15	....	.66	1.10	2.39	1.28	1.06	.95	.85	1.41
16	....	.65	.90	2.14	1.36	1.06	.97	.84	1.59
17	....	.60	.90	2.39	1.46	1.04	.95	.85	1.58
18	....	.60	.82	2.49	1.38	1.01	.95	.86	1.39
19	....	.60	.80	2.29	1.48	1.01	.90	.85	1.14
20	....	.58	.80	2.19	1.53	1.01	.95	.86	.89
21	....	.58	.76	2.09	1.48	.98	.95	.93	.89
22	....	.58	.78	1.99	1.40	1.01	.87	.88	.94
23	....	.58	.76	1.89	1.43	1.00	.85	.84	.99
24	....	.59	.84	1.79	1.41	1.06	.90	.84	1.04
25	....	.58	.85	1.69	1.38	1.06	.90	.84	1.04
26	0.65	.65	1.05	1.59	1.36	1.06	.90	.81	....
27	.72	.72	.95	1.59	1.38	1.06	.87	.84	....
28	.75	.70	.90	1.79	1.28	1.06	.85	.86	....
29	.65	.70	.90	1.59	1.26	1.06	.85	.89	....
30	.65	.65	.90	1.59	1.26	1.06	.85	.92	....
31	.65	....	.95	....	1.33	1.06	....	.96	....

NOTE.—Gage heights distorted by ice Nov. 12 to 25.

Daily discharge, in second-feet, of Wood River near Meeteetse, Wyo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	41	41	138	228	153	80	28	88
2	....	41	49	142	228	153	80	58	90
3	....	41	46	138	221	138	80	48	90
4	....	33	49	150	210	141	80	52	88
5	....	36	60	162	228	138	85	58	88
6	....	35	68	177	210	138	78	60	82
7	....	39	79	174	228	123	80	58	82
8	....	43	79	177	228	123	80	56	90
9	....	33	95	256	193	123	70	58	78
10	....	35	81	138	159	123	78	56	78
11	....	35	72	192	124	123	76	52	82
12	....	33	68	202	135	123	74	56	....
13	....	32	68	256	129	117	78	52	....
14	....	41	79	239	144	95	70	52	....
15	....	43	140	615	159	95	70	50	....
16	....	41	90	506	186	95	74	48	....
17	....	33	90	615	221	90	70	50	....
18	....	33	72	665	193	82	70	52	....
19	....	33	68	570	228	82	60	50	....
20	....	30	68	520	246	82	70	52	....
21	....	30	60	470	228	76	70	66	....
22	....	30	64	426	200	82	54	56	....
23	....	30	60	386	210	80	50	48	....
24	....	32	77	346	204	95	60	48	....
25	....	30	79	306	193	95	60	48	....
26	41	41	128	266	186	95	60	42	....
27	53	53	102	266	193	95	54	48	....
28	58	49	90	346	159	95	50	52	....
29	41	49	90	266	153	95	50	58	....
30	41	41	90	266	153	95	50	64	....
31	41	....	102	....	176	95	....	72	....

NOTE.—Daily discharge determined from fairly well defined rating curves applicable Sept. 15, 1910, to June 18, 1911, and June 19 to Nov. 11, 1911.

Monthly discharge of Wood River near Meeteetse, Wyo., for 1910–11.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1910.					
September 15–30	102	64	76	2,410	B.
October	79	44	58.7	3,610	B.
November	58	49	53.8	3,200	B.
December	53		46.4	2,850	C.
1911.					
January			*a* 40	2,460	D.
February			*a* 35	1,940	D.
March			41.1	2,530	D.
April	53	30	37.2	2,210	B.
May	140	41	77.5	4,770	B.
June	665	138	313	18,600	B.
July	246	129	197	12,100	B.
August	153	76	108	6,640	B.
September	85	50	68.7	4,090	B.
October	72	28	53.2	3,270	B.
November	90	78	72.3	4,300	C.
December			*a* 50	3,070	D.
The year			91.1	66,000	

a Estimated.

NOTE.—Discharge Dec. 11 to 31, 1910, estimated at 45 second-feet per day; Mar. 1 to 25, 1911, estimated at 40 second-feet; Nov. 12 to 30, 1911; estimated at 65 second-feet.

LITTLE BIGHORN RIVER NEAR WYOLA, MONT.

Location.—One-fourth mile below proposed headworks of Little Bighorn canal No. 3, in the N. ½ SW. ¼ sec. 28, T. 8 S., R. 35 E., about 16 miles above the mouth of Lodge Grass Creek.

Records available.—September 7 to October 31, 1911.

Gage.—Overhanging chain gage on right bank.

Channel.—Practically permanent; bed of stream is composed of gravel and cobblestones.

Discharge measurements.—Made by wading at ford below the gage.

Winter flow.—Channel filled with ice during the winter months; winter gage heights are not reliable.

Diversion.—None.

The following discharge measurement was made by W. A. Lamb:

September 7, 1911: Gage height, 4.08 feet; discharge, 91 second-feet.

Daily gage height, in feet, of Little Bighorn River near Wyola, Mont., for 1911.

[Charles C. Dillon, observer.]

Day.	Sept.	Oct.	Day.	Sept.	Oct.	Day.	Sept.	Oct.
1		3.95	11	3.96	3.95	21	3.95	3.95
2		3.95	12	3.97	3.95	22	3.95	3.95
3		3.95	13	3.95	3.95	23	3.95	4.01
4		4.00	14	3.96	3.95	24	4.00	4.00
5		4.00	15	3.95	4.00	25	4.00	4.00
6		3.98	16	3.95	4.00	26	3.96	3.98
7	4.08	3.95	17	3.95	3.96	27	3.95	3.98
8	4.01	3.95	18	3.95	3.95	28	3.95	3.95
9	4.01	3.95	19	3.95	3.95	29	3.95	3.95
10	3.96	3.95	20	3.95	3.96	30	3.95	3.95
						31		3.95

LITTLE BIGHORN RIVER NEAR CROW AGENCY, MONT.

Location.—At the Chicago, Burlington & Quincy Railroad bridge 2 miles south of Crow Agency, Mont., in W. ½ sec. 18, T. 3 S., R. 35 E., about 14 miles above the junction with Bighorn River.

Records available.—March 24, 1905, to June 30, 1906; September 7, 1911, to December 31, 1911.

Gage.—Vertical staff attached to downstream end of a pile bridge pier. The records from March 24, 1905, to June 30, 1906, were obtained from a standard chain gage attached to the upstream side of the railroad bridge at Crow Agency, about 2 miles farther downstream. No tributaries enter between these two points.

Channel.—Permanent, broken by the piers of the bridge. Bed of the stream is coarse gravel and cobblestones. Current is sluggish at the gage.

Discharge measurements.—Made from downstream side of the bridge; low-water measurements are made by wading at the ford about 75 feet above the bridge.

Winter flow.—Affected by ice, which forms at the control below the bridge.

Diversion.—None.

Discharge measurements of Little Bighorn River near Crow Agency, Mont., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 5	W. A. Lamb	4.0	61
Nov. 17	do	(a)	100

[a] Ice.

SHOSHONE RIVER AT CORBETT DAM, WYO.

Location.—In the NE. ¼ sec. 7, T. 53 N., R. 100 W., at the Corbett diversion dam, 8 miles below Cody, Wyo.

Records available.—April 20, 1908, to October 25, 1911.

Drainage area.—Not measured at this station; the drainage area above Cody is 1,400 square miles. Sage Creek, the only important tributary that enters between this station and Cody, drains only about 25 square miles.

Gage.—Forty feet above the crest of the dam; readings represent height of water above crest.

Determinations of discharge.—The discharge is computed by considering the dam as a weir and the sluice tunnel gates as submerged orifices. The dam is of reinforced concrete, of the buttressed type, having on the upstream side a deck 2½ feet thick sloping 1 to 1 and supported by buttresses 2 feet thick spaced 14 feet on centers; it raises the low-water elevation of the river 10.2 feet; the length between abutments is 400 feet.

Cooperation.—Gage heights and gate openings furnished by the United States Reclamation Service.

The following discharge measurement was made by B. E. Jones at the highway bridge at Cody:

August 7, 1911: Gage height, 1.83 feet; discharge, 3,720 second-feet.

Daily gage height, in feet, of Shoshone River at Corbett dam, Wyo., for 1911.

[J. A. Fleming, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	0.35	0.47	0.34	0.56	0.75	1.14	1.90	1.56	1.65	0.98
2	.36	.44	.35	.65	.70	1.17	1.90	1.84	1.64	.99
3	.46	.48	.35	.65	.69	1.21	1.88	1.84	1.61	.99
4	.41	.37	.37	.51	.68	1.20	1.88	1.84	1.60	.99
5	.45	.37	.39	.57	.72	1.32	1.90	1.85	1.58	.96
6	.51	.39	.39	.53	.80	1.37	1.88	1.85	1.56	.94
7	.46	.38	.40	.56	.82	1.20	1.88	1.85	1.55	.93
8	.37	.34	.43	.54	.85	1.29	1.88	1.83	1.56	.90
9	.35	.31	.44	.57	.89	1.36	1.88	1.84	1.55	.88
10	.46	.33	.35	.56	.92	1.38	1.88	1.84	1.53	.87
11	.38	.36	.42	.55	.90	1.40	1.87	1.83	1.50	.83
12	.46	.38	.35	.51	.88	1.40	1.88	1.81	1.46	.79
13	.54	.41	.37	.57	.84	1.43	1.88	1.82	1.44	.70
14	.78	.35	.41	.46	.89	1.46	1.88	1.80	1.43	.54
15	.60	.35	.44	.50	.90	1.53	1.87	1.80	1.43	.54
16	.43	.35	.46	.46	.90	1.59	1.87	1.79	1.43	.53
17	.41	.38	.48	.50	.90	1.63	1.88	1.79	1.41	.48
18	.43	.32	.56	.55	.90	1.67	1.88	1.77	1.33	.49
19	.39	.36	.45	.58	.90	1.70	1.87	1.75	1.30	.47
20	.39	.36	.51	.57	.93	1.73	1.90	1.74	1.28	.40
21	.40	.35	.57	.58	.92	1.75	1.87	1.74	1.27	.37
22	.32	.32	.62	.68	.93	1.78	1.87	1.74	1.20	.32
23	.32	.30	.63	.69	.93	1.80	1.80	1.72	1.09	.35
24	.45	.32	.65	.55	.92	1.80	1.77	1.71	1.05	.35
25	.41	.35	.63	.55	.90	1.80	1.73	1.71	1.04	.35
26	.41	.49	.55	.61	.94	1.84	1.67	1.71	1.04	....
27	.41	.44	.50	.68	1.08	1.85	1.66	1.69	1.03	....
28	.40	.36	.47	.72	1.11	1.83	1.65	1.69	1.02	....
29	.40	....	.56	.76	1.05	1.86	1.67	1.67	1.01	....
30	.42	....	.65	.77	1.05	1.87	1.60	1.66	1.00	....
31	.46	....	.52	....	1.06	....	1.60	1.66	....	....

Daily discharge, in second-feet, of Shoshone River and sluices at Corbett dam, Wyo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	265	428	254	566	890	1,740	3,850	3,610	3,080	1,360
2	276	386	265	715	800	1,810	3,850	3,660	3,060	1,380
3	414	442	265	715	783	1,900	3,790	3,660	2,970	1,380
4	344	287	287	486	766	1,880	3,790	3,660	2,940	1,380
5	400	287	319	582	836	2,180	3,850	3,690	2,880	1,310
6	486	319	319	518	980	2,310	3,790	3,690	2,830	1,270
7	414	308	330	566	1,020	1,880	3,790	3,690	2,800	1,250
8	287	254	372	534	1,080	2,100	3,790	3,630	2,830	1,180
9	265	221	386	582	1,160	2,290	3,790	3,660	2,800	1,140
10	414	243	265	566	1,220	2,340	3,790	3,660	2,740	1,120
11	308	276	358	550	1,180	2,390	3,750	3,630	2,660	1,040
12	414	308	265	486	1,140	2,390	3,790	3,560	2,550	962
13	534	344	287	582	1,060	2,470	3,790	3,590	2,500	800
14	944	265	344	414	1,160	2,550	3,790	3,530	2,470	534
15	630	265	386	470	1,180	2,740	3,750	3,530	2,470	534
16	372	265	414	414	1,180	2,910	3,750	3,500	2,470	518
17	344	308	442	470	1,180	3,030	3,790	3,500	2,420	442
18	372	232	566	550	1,180	3,140	3,790	3,440	2,210	456
19	319	276	400	598	1,180	3,230	3,750	3,380	2,130	428
20	319	276	486	582	1,250	3,320	3,850	3,350	2,080	330
21	330	265	582	598	1,220	3,380	3,750	3,350	2,060	287
22	232	232	664	766	1,250	3,470	3,960	3,350	1,880	232
23	232	210	681	783	1,250	3,530	4,030	3,290	1,620	265
24	400	232	715	550	1,220	3,530	3,940	3,260	1,520	265
25	344	265	681	550	1,180	3,530	3,960	3,260	1,500	265
26	344	456	550	647	1,270	3,660	3,870	3,260	1,500	....
27	344	386	470	766	1,590	3,690	3,840	3,200	1,470	....
28	330	276	428	836	1,660	3,630	3,810	3,200	1,450	....
29	330	....	566	908	1,520	3,720	4,020	3,140	1,420	....
30	358	....	715	926	1,520	3,750	4,110	3,110	1,400	....
31	414	....	502	....	1,540	....	4,110	3,110	....	....

Monthly discharge of Shoshone River and sluices at Corbett dam, Wyoming, for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	944	232	380	23,400
February	456	210	297	16,500
March	715	254	438	26,900
April	926	414	609	36,200
May	1,660	766	1,180	72,600
June	3,750	1,740	2,820	168,000
July	4,110	3,750	3,850	237,000
August	3,690	3,110	3,460	213,000
September	3,060	1,400	2,290	136,000
October 1–25	1,380	232	805	39,900
The period				970,000

Daily discharge, in second-feet, of Corbett tunnel at Corbett dam, Wyoming, for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1			62	132	132	194		114
2			62	112	120	162		88
3			62	160	166	128		84
4			70	226	182	96		90
5			94	0	200	96	170	100
6			134	90	224	96	158	104
7	15		112	386	224	96	138	116
8	51		118	304	260	80	58	130
9	51		136	276	296	64	64	140
10	18		170	256	320	64	64	144
11			186	256	296	64	94	132
12			172	256	272	66	102	108
13			164	260	308	84	120	98
14			176	288	328	112	122	110
15			186	326	338	128	116	116
16			172	332	284	128	120	132
17			158	282	276	150	122	146
18	15		154	252	296	180	118	158
19	51	8	162	252	250	200	122	168
20	51	0	158	252	192	160	120	196
21	40	44	176	218	158	140	116	236
22		84	186	162	128	174	116	
23		68	186	142	128	220	110	
24		44	200	170	150	236	98	
25		44	206	142	194	214	88	
26		52	78	0	238	184	78	
27		84	34	58	252		66	
28		60	74	278	216		62	
29		44	108	236	174		94	
30		54	148	190	148		114	
31			154		180			

Monthly discharge of Corbett tunnel at Corbett dam, Wyoming, for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 7-10, 18–21	51	15	36.5	579
April 19-30	84	0	48.8	1,160
May	206	34	137	8,420
June	386	0	210	12,500
July	338	120	224	13,800
August 1–26	236	64	135	6,960
September 5–30	170	58	106	5,470
October 1-21	236	84	129	5,370

NOTE.—No records available for Aug. 27 to Sept. 4 and after Oct. 21. Daily discharges were computed considering the gate openings as submerged orifices. Considering the uncertainties involved in the method of computation, the accuracy of the above monthly means is not better than "C."

SOAP CREEK NEAR ST. XAVIER, MONT.

Location.—One-fourth mile above the headworks of Soap Creek ditch, in the W. ½ NW. ¼ sec. 2, T. 6 S., R. 32 E., about 11 miles southeast of St. Xavier, Mont.

Records available.—September 11 to November 11, 1911.

Drainage area.—Not measured.

Gage.—An overhanging chain gage on the left bank about 100 feet above the ford.

Channel.—Permanent; bed of stream is gravel and sand at gage and firm gravel and cobblestones at the control 50 feet below the gage.

Discharge measurements.—Made by wading at the ford 100 feet below the gage.

Winter flow.—Stream frozen during the winter months; winter gage heights of no value.

Diversion.—None above gage.

The following discharge measurement was made by W. A. Lamb:

September 11, 1911: Gage height, 3.05 feet; discharge, 13 second-feet.

Daily gage height, in feet, of Soap Creek near St. Xavier, Mont., for 1911.

[W. G. Wanett, observer.]

Day.	Sept.	Oct.	Nov.	Day.	Sept.	Oct.	Nov.	Day.	Sept.	Oct.	Nov.
1		3.11		11	3.05		2.95	21		3.15	
2				12				22	3.08		
3				13				23			
4			3.14	14	3.08	3.15		24	3.12		
5				15				25			
6				16	3.10			26	3.10		
7				17				27			
8				18	3.10			28	3.12	2.98	
9				19				29			
10				20	3.10			30			

ROTTENGRASS CREEK NEAR ST. XAVIER, MONT.

Location.—One-fourth mile above the crossing of the Bighorn canal, in the SW ¼ SW. ¼ sec. 31, T. 4 S., R. 33 E.; about 4 miles southeast of St. Xavier, Mont.

Records available.—September 9 to November 11, 1911.

Gage.—Overhanging chain gage on left bank.

Channel.—Liable to change; bed of stream is composed of sand and silt. The channel is deep and the current sluggish for several hundred feet above and below the gage.

Discharge measurements.—Made by wading above the gage.

Winter flow.—Channel freezes during the winter months; winter gage heights of no value.

Diversions.—None.

The following discharge measurement was made by W. A. Lamb:

September 9, 1911: Gage height, 2.29 feet; discharge, 0.3 second-foot

Daily gage height, in feet, of Rottengrass Creek at St. Xavier, Mont., for 1911.

[W. H. Broadbent, observer.]

Day.	Sept.	Oct.	Nov.	Day.	Sept.	Oct.	Nov.	Day.	Sept.	Oct.	Nov.
1				11			3.15	21		2.97	
2				12	2.61	2.98		22			
3		2.70		13		2.97		23			
4				14	2.53	2.96		24	2.32	3.02	
5				15				25			
6		2.97		16	2.47	3.37		26			
7				17		3.18		27	2.30	3.10	
8				18		3.10		28			
9		2.96		19		3.23		29			
10		2.96		20		2.98		30		3.18	
								31			

LODGEGRASS CREEK NEAR LODGEGRASS, MONT.

Location.—Above road crossing one-fourth mile above headworks of Lodgegrass ditch, in the SW. ¼ sec. 29, T. 6 N., R. 35 E., about 6 miles southwest of Lodgegrass, Mont.

Records available.—September 9 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Overhanging chain gage on left bank, 50 feet above the road crossing.

Channel.—Permanent at control below the gage. Bed of stream is composed of mud and silt at the gage, but of firm gravel and cobblestones at the ford below the gage. Current sluggish at gage at low stages.

Discharge measurements.—Made by wading at the ford below the gage.

Winter flow.—Stream freezes over during winter months; winter gage heights of no value.

Diversion.—None.

The following discharge measurement was made by W. A. Lamb:

September 8, 1911; Gage height, 3.22 feet; discharge, 16 second-feet.

TONGUE RIVER BASIN.

TONGUE RIVER NEAR DAYTON, WYO.

Location.—At the edge of the Bighorn National Forest, in the NE. ¼ sec. 11, T. 56 N., R. 87 W., 3 miles southwest of Dayton; 3¾ miles below the mouth of Sheep Creek.

Records available.—October 24 to December 16, 1911. From May 3 to October 31, 1903, a station was maintained at Dayton.

Drainage area.—214 square miles (measured from topographic sheets).

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made from highway bridge 2 miles below station during high water, and by wading at the gage at ordinary stages.

Winter flow.—Ice causes some backwater during the winter months.

Diversions.—The only diversion above the station is a log flume which heads 15 miles above. One hundred feet below the station is the intake for the Highline Community ditch. Prior to July 1, 1912, there were adjudicated diversions from Tongue River amounting to 213 second-feet in Wyoming.

Accuracy.—Owing to a lack of discharge measurements no estimates of flow have been made.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. B. Waha:

October 24, 1911: Gage height, 1.50 feet; discharge, 63 second-feet.

Daily gage height, in feet, of Tongue River near Dayton, Wyo., for 1911.

[H. E. Anderson, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	......	......	1.5	11	......	......	......	21	......	1.5	......
2	......	......	1.4	12	......	......	......	22	......	1.4	......
3	......	......	......	13	......	......	1.4	23	......	......	......
4	......	......	1.4	14	......	......	1.4	24	1.5	1.4	......
5	......	......	1.4	15	......	......	1.4	25	1.6	......	......
6	......	......	1.4	16	......	......	1.4	26	......	......	......
7	......	......	1.4	17	......	......	......	27	......	......	......
8	......	......	1.4	18	......	......	......	28	......	[a] 2.0	......
9	......	......	1.4	19	......	......	......	29	......	[a] 2.0	......
10	......	......	......	20	......	1.5	......	30	......	1.5	......
								31	......	......	......

[a] Ice caused backwater.

TONGUE RIVER AT CARNEYVILLE, WYO.

Location.—At the highway bridge at Carneyville, Wyo., about 2 miles above the mouth of Big Goose Creek.

Records available.—May 25, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Standard chain gage on highway bridge.

Channel.—Believed to be permanent; bed of stream is composed of gravel and cobblestones.

Discharge measurements.—Made from bridge at high stages and by wading at low and medium stages.

Winter flow.—Gage heights affected by ice during the winter months.

Diversion.—See Tongue River near Dayton, Wyo.

Discharge measurements of Tongue River at Carneyville, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 5	W. A. Lamb	3.44	285
June 17	R. Richards	3.82	436
July 31	B. E. Jones	2.77	82
Sept. 7	R. Richards	2.70	73
Nov. 18[a]	W. A. Lamb	3.15	84

[a] Ice conditions.

Daily gage height, in feet, of Tongue River at Carneyville, Wyo., for 1911.

[John Bone, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	4.2	3.2	2.85	2.7	2.75	2.85	16	4.15	3.95	2.75	2.7	2.7	2.95	3.15
2	......	4.2	3.05	2.8	2.7	2.85	2.85	17	3.65	3.7	2.8	2.7	2.7	2.85	3.35
3	......	4.0	3.15	2.8	2.7	2.85	2.9	18	3.7	3.65	2.85	2.7	2.75	2.95	3.05
4	......	4.0	3.0	2.8	2.65	2.85	2.9	19	3.6	3.65	2.8	2.6	2.9	2.9	3.15
5	......	4.1	3.0	3.1	2.75	2.85	2.85	20	3.5	3.5	2.85	2.5	2.95	2.8	3.1
6	......	3.9	2.9	2.9	2.65	2.85	2.85	21	3.45	3.4	2.85	2.5	2.9	2.8	3.05
7	......	3.8	2.85	2.85	2.7	2.85	2.85	22	3.6	3.4	2.85	2.7	2.9	2.9	3.0
8	......	3.85	2.85	2.9	2.95	2.8	2.85	23	3.55	3.65	2.8	2.65	2.9	2.9	3.0
9	......	3.75	2.85	2.9	2.8	2.8	2.75	24	3.6	3.45	2.8	2.8	2.95	2.85	3.0
10	......	3.7	2.85	2.85	2.7	2.85	2.95	25	3.65	3.3	2.8	2.8	2.9	2.95	2.95
11	......	3.6	2.8	2.85	2.65	2.8	3.05	26	3.85	3.35	2.75	2.65	......	2.9	3.0
12	......	3.6	2.85	2.9	2.6	2.75	3.2	27	3.75	3.35	2.6	2.7	......	2.65	2.9
13	......	3.5	2.85	2.9	2.5	3.05	3.25	28	3.65	3.2	2.6	2.7	......	2.7	3.05
14	......	3.6	2.8	2.9	2.55	2.85	3.25	29	3.65	3.05	2.65	2.7	......	2.8	3.1
15	3.7	3.85	2.85	2.7	2.6	3.0	3.25	30	3.7	3.0	2.65	2.65	......	2.75	3.25
								31	3.7	......	2.7	2.7	......	2.85	......

NOTE.—Gage heights distorted by ice Nov. 10 to 30.

Daily discharge, in second-feet, of Tongue River at Carneyville, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	200	603	200	101	72	81	101	16	580	490	81	72	72	125	......
2	220	603	153	90	72	101	101	17	365	384	90	72	72	101	......
3	240	513	184	90	72	101	112	18	384	365	101	72	81	125	......
4	260	513	138	90	65	101	112	19	345	365	90	58	112	112	......
5	285	558	138	168	81	101	101	20	307	307	101	49	125	90	......
6	295	468	112	112	65	101	101	21	288	270	101	49	112	90	......
7	305	425	101	101	72	101	101	22	345	270	101	72	112	112	......
8	315	446	101	112	125	90	101	23	326	365	90	65	112	112	......
9	325	404	101	112	90	90	81	24	345	288	90	90	125	101	......
10	335	384	101	101	72	101	......	25	365	234	90	90	112	125	......
11	345	345	90	101	65	90	......	26	446	252	81	65	107	112	......
12	355	345	101	112	58	81	......	27	404	252	58	72	102	65	......
13	365	307	101	112	49	153	......	28	365	200	58	72	97	72	......
14	375	345	90	112	54	101	......	29	365	153	65	72	92	90	......
15	384	446	101	72	58	138	......	30	384	138	65	65	87	81	......
								31	384	......	72	72	......	101	......

NOTE.—Daily discharge determined from a rating curve fairly well defined between 60 and 500 second-feet; discharge estimated May 1 to 4, May 6 to 14, and Sept. 26 to 30.

Monthly discharge of Tongue River at Carneyville, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	580	200	342	21,000	C.
June	603	138	368	21,900	C.
July	200	58	101	6,210	C.
August	168	49	86.9	5,340	C.
September	125	49	86.3	5,140	C.
October	153	65	101	6,210	C.
November	112	75	82.9	4,930	C.
December			[a] 50	3,070	C.
The period				73,800	

[a] Estimated.

NOTE.—Estimated discharge Nov. 10 to 30, 75 second-feet.

GOOSE CREEK AT SHERIDAN, WYO.

Location.—At footbridge in city park at Sheridan, Wyo.

Records available.—From April 10, 1896, to August 1, 1897, and from May 14 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff attached to under pier of the footbridge. The gage readings from April 10, 1896, to August, 1897, were made from a gage at the Fifth Avenue Bridge, below the mouth of Little Goose Creek.

Channel.—Practically permanent; bed of stream is composed of gravel and cobblestones.

Discharge measurements.—Made from the footbridge at high stages and by wading at low stages.

Winter flow.—Gage heights during winter months are affected by ice at the gage.

Diversion.—During the irrigation season the greater part of the flow is diverted for irrigation above the gage. About 7,500 acre-feet of water are stored in the mountains on the headwaters of the stream and diverted in the Little Goose Creek drainage area. There are also a number of smaller diversions into the Little Goose Creek drainage area after the stream leaves the mountains. The records at the station show the amount of water that is not used in the Big Goose drainage basin.

Discharge measurements of Goose Creek at Sheridan, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 14	W. A. Lamb	4.06	131
June 16	R. Richards	5.02	493
July 31	B. E. Jones	2.95	5.5
Sept. 10	R. Richards	3.20	18.2
Nov. 18[a]	W. A. Lamb	3.55	38

[a] Ice conditions.

Daily gage height, in feet, of Goose Creek at Sheridan, Wyo., for 1911.

[H. A. Loucks, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	4.50	3.19	3.06	3.00	3.26	3.35	16	4.60	5.10	2.88	3.07	3.12	3.32	3.60
2	......	4.80	3.20	3.04	2.99	3.26	3.50	17	4.80	4.80	2.86	3.05	3.19	3.38	3.54
3	......	5.00	3.32	3.28	2.98	3.30	3.49	18	4.60	4.32	2.85	3.05	3.17	3.37	3.51
4	......	4.70	3.44	3.24	3.02	3.26	3.43	19	4.46	4.45	2.87	3.08	3.20	3.32	3.46
5	......	4.80	3.12	3.48	3.06	3.30	3.38	20	4.42	4.37	2.88	3.10	3.24	3.42	3.46
6	......	4.70	3.18	3.62	3.15	3.28	3.42	21	4.38	4.50	2.88	2.96	3.26	3.31	3.41
7	......	4.35	3.28	3.43	3.20	3.29	3.40	22	4.42	4.38	2.84	2.90	3.24	3.26	3.40
8	......	4.50	3.28	3.40	3.36	3.22	3.40	23	4.14	4.18	2.88	2.88	3.25	3.27	3.46
9	......	4.60	3.15	3.40	3.24	3.20	3.38	24	4.02	4.11	3.20	2.94	3.26	3.44	3.40
10	......	4.60	3.18	3.42	3.20	3.19	3.42	25	4.00	4.04	3.30	3.02	3.22	3.48	......
11	......	4.20	3.14	3.40	3.19	3.20	3.60	26	4.26	3.90	3.30	3.00	3.25	3.50	......
12	......	4.17	3.19	3.34	3.14	3.20	3.60	27	4.34	3.64	3.32	3.01	3.16	3.30	......
13	......	4.42	3.05	3.38	3.09	3.28	3.65	28	4.09	3.55	3.32	3.02	3.20	3.27	......
14	4.05	4.65	2.91	3.18	3.16	3.36	3.66	29	3.94	3.39	3.26	3.00	3.23	3.34	......
15	4.45	5.05	2.92	3.10	3.14	3.27	3.68	30	4.02	3.24	3.15	3.00	3.30	3.42	......
								31	4.23	......	2.96	3.00	......	3.44	......

NOTE.—Gage heights distorted by ice after Nov. 11.

Daily discharge, in second-feet, of Goose Creek at Sheridan, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	255	17	10	8.0	22	29	16	295	530	3.6	11	13	27	......
2	......	380	18	9.6	7.6	22	43	17	380	380	3.2	10	17	31	......
3	......	480	27	24	7.2	25	42	18	295	196	3.0	10	16	31	......
4	......	335	37	21	8.8	22	36	19	241	238	3.4	11	18	27	......
5	......	380	13	41	10	25	31	20	227	211	3.6	12	21	35	......
6	......	335	17	58	15	24	35	21	214	255	3.6	6.4	22	26	......
7	......	205	24	36	18	24	33	22	227	214	2.8	4.0	21	22	......
8	......	255	24	33	30	19	33	23	150	160	3.6	3.6	22	23	......
9	......	295	15	33	21	18	31	24	123	142	18	5.6	22	37	......
10	......	295	17	35	18	17	35	25	119	127	25	8.8	19	41	......
11	......	165	14	33	17	18	......	26	180	101	25	8.0	22	43	......
12	......	158	17	28	14	18	......	27	202	61	27	8.4	16	25	......
13	......	227	10	31	12	24	......	28	138	49	27	8.8	18	23	......
14	130	315	4.4	17	16	30	......	29	109	32	22	8.0	19	28	......
15	238	505	4.8	12	14	23	......	30	123	21	15	8.0	25	35	......
								31	172	......	7.2	8.0	......	37	......

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Goose Creek at Sheridan, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 14–31	380	119	198	7,060	B.
June	530	21	243	14,500	B.
July	37	2.8	14.6	898	B.
August	58	3.6	17.8	1,090	B.
September	30	7.2	16.9	1,010	B.
October	43	17	26.5	1,630	B.
November	43	29	31.6	1,880	C.
December			[a] 25	1,540	D.
The period				29,600	

[a] Estimated.

NOTE.—Discharge Nov. 11 to 30 estimated at 30 second-feet.

LITTLE GOOSE CREEK AT SHERIDAN, WYO.

Location.—At the footbridge about 200 yards above the point where the stream parallels the Chicago, Burlington & Quincy Railroad and about one-fourth mile above the junction with Goose Creek at Sheridan, Wyo.

Records available.—May 1, 1896, to August 1, 1897; May 14 to December 31, 1911.

Gage.—A staff attached to the downstream end of the right abutment of the footbridge. The gage read from May 1, 1896, to August 1, 1897, was at the Broadway Bridge, 600 feet below the site of the present gage.

Channel.—Liable to shift; bed of stream is composed of sand and gravel.

Discharge measurements.—Made from the downstream side of the footbridge; low-water measurements are made by wading.

Winter flow.—Stream freezes solid at the control below gage.

Diversions.—During the irrigation season, from May to September, the greater part of the stream is diverted for irrigation above the station. The records at this point show the amount of water that is not being used for irrigation.

Accuracy.—Results for 1911 are believed to be good. The shifting character of the channel may affect future results.

Discharge measurements of Little Goose Creek at Sheridan, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 14	W. A. Lamb	2.75	3.2
June 16	R. Richards	3.42	86
July 31	R. E. Jones	2.65	1.10
Sept. 10	R. Richards	2.72	2.9
Nov. 18[a]	W. A. Lamb	3.55	36

[a] Ice conditions.

Daily gage height, in feet, of Little Goose Creek at Sheridan, Wyo., for 1911.

[W. E. Hammontree, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	2.85	2.72	2.70	2.80	2.98	3.00	16	3.40	3.45	2.62	2.82	2.75	3.00	3.50
2	......	2.95	2.72	2.65	2.80	3.00	3.02	17	3.25	3.10	2.62	2.85	2.80	3.00	3.50
3	......	2.85	2.65	2.70	2.80	3.00	3.02	18	3.15	2.95	2.70	2.82	2.85	3.00	3.50
4	......	2.80	2.62	2.65	2.80	3.00	3.02	19	3.08	2.90	2.75	2.75	2.90	3.00	3.45
5	......	2.70	2.62	2.65	2.80	3.00	3.02	20	2.98	2.80	2.72	2.70	2.90	3.02	3.40
6	......	2.80	2.60	2.80	2.88	3.00	3.02	21	2.90	2.85	2.70	2.70	2.90	3.00	3.40
7	......	2.65	2.70	2.80	2.80	3.00	3.02	22	2.80	2.90	2.70	2.70	2.90	3.00	3.40
8	......	2.70	2.65	2.80	2.80	3.00	3.05	23	2.75	2.85	2.70	2.80	2.90	3.00	3.40
9	......	2.65	2.75	2.70	2.78	3.00	3.05	24	2.70	2.70	2.70	2.75	2.90	3.00	......
10	......	2.65	2.62	2.70	2.78	3.00	3.05	25	2.85	2.60	2.70	2.80	2.90	3.00	......
11	......	2.60	2.65	2.90	2.78	3.00	3.05	26	3.00	2.65	2.70	2.80	2.92	3.00	......
12	......	2.60	2.65	2.90	2.80	3.00	3.05	27	3.10	2.62	2.70	2.75	3.00	3.00	......
13	......	2.60	2.65	2.88	2.80	3.00	3.05	28	3.05	2.66	2.70	2.80	2.95	3.00	......
14	2.75	2.60	2.65	2.88	2.75	3.00	3.05	29	2.85	2.65	2.62	2.80	2.98	3.00	......
15	3.06	3.00	2.62	2.90	2.72	3.00	3.42	30	2.70	2.65	2.62	2.80	2.98	3.00	......
								31	2.70	......	2.60	2.80	......	3.00	......

NOTE.—Gage heights distorted by ice after Nov. 14.

Daily discharge, in second-feet, of Little Goose Creek at Sheridan, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	9.0	2.7	1.9	6.0	20	22	16	82	92	0.4	7.2	4.0	22	......
2	......	17	2.7	1.0	6.0	22	24	17	56	34	.4	9.0	6.0	22	......
3	......	9.0	1.0	1.9	6.0	22	24	18	41	17	1.9	7.2	9.0	22	......
4	......	6.0	.4	1.0	6.0	22	24	19	32	12	4.0	4.0	12	22	......
5	......	1.9	.4	1.0	6.0	22	24	20	20	6.0	2.7	1.9	12	24	......
6	......	6.0	.0	6.0	11	22	24	21	12	9.0	1.9	1.9	12	22	......
7	......	1.0	1.9	6.0	6.0	22	24	22	6.0	12	1.9	1.9	12	22	......
8	......	1.9	1.0	6.0	6.0	22	28	23	4.0	9.0	1.9	6.0	12	22	......
9	......	1.0	4.0	1.9	5.2	22	28	24	1.9	1.9	1.9	4.0	12	22	......
10	......	1.0	.4	1.9	5.2	22	28	25	9.0	.0	1.9	6.0	12	22	......
11	......	.0	1.0	12	5.2	22	28	26	22	1.0	1.9	6.0	14	22	......
12	......	.0	1.0	12	6.0	22	28	27	34	.4	1.9	4.0	22	22	......
13	......	.0	1.0	11	6.0	22	28	28	28	1.1	1.9	6.0	17	22	......
14	4.0	.0	1.0	11	4.0	22	28	29	9.0	1.0	.4	6.0	20	22	......
15	29	22	.4	12	2.7	22	......	30	1.9	1.0	.4	6.0	20	22	......
								31	1.9	......	.0	6.0	......	22	......

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Little Goose Creek at Sheridan, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 14-31	82	1.9	21.9	782	C.
June	92	.0	9.11	542	C.
July	4.0	.0	1.43	87.9	C.
August	12	1.0	5.47	336	C.
September	22	2.7	6.65	397	C.
October	24	20	22.0	1,350	C.
November	28	22	25.4	1,510	D.
December	....	....	[a] 15	922	
The period	....	....	....	5,390	

[a] Estimated.

NOTE.—Discharges Nov. 15 to 30 estimated at 25 second-feet.

POWDER RIVER BASIN.

SOUTH FORK OF POWDER RIVER NEAR KAYCEE, WYO.

Location.—At Z. W. French's ranch, about 7 miles southeast of Kaycee, Wyo.

Records available.—May 11 to December 31, 1911.

Gage.—An overhanging chain gage on left bank of the stream opposite the ranch buildings.

Channel.—Liable to change; bed composed of gravel and sand.

Discharge measurements.—Made by wading near the gage.

Winter records.—Gage heights are affected by ice during the winter months. The stream freezes solid at times.

Diversion.—Small diversions for irrigation are made above the stations.

Accuracy.—On account of the shifting channel results are only fair.

Discharge measurements of South Fork of Powder River near Kaycee, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 11	W. A. Lamb	5.88	110
June 20	R. Richards	5.39	30
Sept. 8	.....do	4.60	1.5

Daily gage height, in feet, of South Fork of Powder River near Kaycee, Wyo., for 1911.

[Z. W. French, observer.]

Day.	May.	June.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	Aug.	Sept.	Oct.	Nov.
1	......	5.0	6.3	......	8.5	4.9	16	5.3	......	......	4.8	5.05	5.2
2	......	5.0	6.1	......	5.95	4.9	17	5.3	......	......	4.8	5.0	5.5
3	......	5.0	6.4	......	5.3	5.2	18	5.2	......	......	4.8	5.1	5.3
4	......	5.0	5.4	......	5.1	5.0	19	5.3	......	......	4.8	5.1	......
5	......	5.9	7.1	......	5.0	5.0	20	5.2	5.4	......	4.8	4.9	......
6	......	5.9	......	......	5.0	5.0	21	5.2	5.4	......	4.8	4.9	......
7	......	5.7	......	......	5.0	5.0	22	5.2	5.0	......	4.8	4.9	......
8	......	5.6	......	4.6	5.0	5.0	23	5.2	5.0	......	4.8	4.9	......
9	......	5.5	......	4.6	5.0	5.3	24	5.2	0.0	......	4.9	4.9	......
10	......	5.3	......	4.6	4.9	5.1	25	5.1	0.0	......	4.9	4.95	......
11	5.8	5.2	......	4.6	4.9	5.0	26	5.0	0.0	......	4.9	4.95	......
12	5.6	......	......	4.6	4.9	5.0	27	5.0	0.0	......	4.9	4.9	......
13	5.4	......	......	4.7	4.9	5.0	28	5.0	0.0	......	4.9	4.9	......
14	5.2	......	......	4.7	5.0	5.2	29	5.0	0.0	......	4.9	4.9	......
15	5.5	......	......	4.7	5.5	5.1	30	5.0	0.0	......	4.9	4.9	......
							31	5.0	......	......	......	4.9	......

MIDDLE FORK OF POWDER RIVER AT KAYCEE, WYO.

Location.—At highway bridge at Kaycee, Wyo.

Records available.—May 11 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff attached to the middle pier of the highway bridge.

Channel.—Permanent at control but shifting at gage. The bed of the stream is composed of gravel and cobblestones. Current sluggish at low water.

Discharge measurements.—Made from bridge at high stages and by wading at low stages.

Winter flow.—Gage heights during the winter months are affected by ice.

Diversion.—The greater part of the flow is diverted above the gage during the irrigation season.

Discharge measurements of Middle Fork of Powder River at Kaycee, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 10	W. A. Lamb	4.10	365
11	do	3.55	162
June 20	R. Richards	3.13	64
July 29	B. E. Jones	2.77	7.6
Sept. 8	R. Richards	3.06	45

Daily gage height, in feet, of Middle Fork of Powder River at Kaycee, Wyo., for 1911.

[P. A. Gatchell, jr., observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	3.4	3.0	2.95	3.0	3.4	3.25	16	3.65	3.7	2.8	3.0	3.0	3.1	......
2	......	3.4	3.0	2.9	3.0	3.2	3.25	17	3.5	3.35	2.8	3.0	3.0	3.2	......
3	......	3.4	2.95	2.9	3.0	3.2	3.3	18	3.45	3.3	2.8	3.0	3.05	3.2	......
4	......	3.4	2.95	2.85	3.0	3.15	3.3	19	3.45	3.2	2.8	3.0	3.05	3.2	......
5	......	3.4	2.9	2.8	3.0	3.1	3.2	20	3.45	3 1	2.8	3.0	3.05	3.15	......
6	......	3.35	2.9	4.0	3.2	3.1	3.2	21	3.5	3.1	2.8	3.0	3.1	3.1	......
7	......	3.3	2.9	3.9	3.1	3.1	3.2	22	3.5	3.2	2.8	3.0	3.1	3.1	......
8	......	3.3	2.9	3.1	3.05	3.2	3.2	23	3.5	3.1	2.8	3.0	3.1	3.15	......
9	......	3.2	2.9	3.1	3.0	3.1	3.2	24	3.5	3.1	2.8	3.05	3.1	3.15	......
10	......	3.2	2.85	3.1	3.0	3.1	3.15	25	3.5	3.15	2.8	3.05	3.1	3.15	......
11	......	3.2	2.85	3.1	3.0	3.1	3.15	26	3.5	3.1	2.8	3.05	3.1	3.15	......
12	3.5	3.15	2.85	3.0	3.0	3.1	......	27	3.5	3.1	2.8	3.05	3.1	3.2	......
13	3.5	3.1	2.8	3.0	3.0	3.1	......	28	3.5	3.1	2.8	3.0	3.1	3.2	......
14	3.48	3.0	2.8	3.0	3.0	3.1	......	29	3.45	3.0	2.8	3.0	3.1	3.2	......
15	3.7	3.2	2.8	3.0	3.0	3.2	......	30	3.45	3.0	2.8	3.0	3.1	3.2	......
								31	3.45	......	3.1	3.0	......	3.2	......

Daily discharge, in second-feet, of Middle Fork of Powder River at Kaycee, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	120	36	29	36	120	84	16	194	210	10	36	36	53	......
2	......	120	36	22	36	73	84	17	147	108	10	36	36	73	......
3	......	120	29	22	36	73	95	18	134	95	10	36	44	73	......
4	......	120	29	16	36	63	95	19	134	73	10	36	44	73	......
5	......	120	22	10	36	53	73	20	134	53	10	36	44	63	......
6	......	108	22	325	73	53	73	21	147	53	10	36	53	53	......
7	......	95	22	285	53	53	73	22	147	73	10	36	53	53	......
8	......	95	22	53	44	73	73	23	147	53	10	36	53	63	......
9	......	73	22	53	36	53	73	24	147	53	10	44	53	63	......
10	......	73	16	53	36	53	63	25	147	63	10	44	53	63	......
11	......	73	16	53	36	53	63	26	147	53	10	44	53	63	......
12	147	63	16	36	36	53	......	27	147	53	10	44	53	73	......
13	147	53	10	36	36	53	......	28	147	53	10	36	53	73	......
14	142	36	10	36	36	53	......	29	134	36	10	36	53	73	......
15	210	73	10	36	36	73	......	30	134	36	10	36	53	73	......
								31	134	......	53	36	......	73	......

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Middle Fork of Powder River at Kaycee, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	210	134	144	8,850	B.
June	210	36	80.2	4,770	A.
July	53	10	16.8	1,030	A.
August	325	10	54.0	3,320	A.
September	73	36	44.5	2,650	A.
October	120	53	64.8	3,980	A.
November	95	50	60.0	3,570	C.
The period				28,200	

NOTE.—Discharge May 1 to 11 estimated at 135 second-feet. Nov. 12 to 30 estimated at 50 second-feet.

NORTH FORK OF POWDER RIVER NEAR KAYCEE, WYO.

Location.—At Jacob Affalter's ranch, on the county road 4 miles north of Kaycee, Wyo.

Records available.—May 11 to December 31, 1911.

Drainage area.—Not measured.

Gage.—An overhanging chain gage on the left bank one-fourth mile above the highway bridge. From May 11 to July 28, 1911, the gage was located 200 feet farther upstream and at a different datum. It was moved because it was within the influence of backwater from beaver dams.

Channel.—Practically permanent. The bed of the stream at the point of control below the gage is composed of permanent gravel and cobblestones, but at the gage it is composed of sand and gravel and is liable to shift during high stages.

Discharge measurements.—Made from the highway bridge one-fourth mile below the gage at high stages and by wading near the gage at low and medium stages.

Winter flow.—Gage heights are affected by ice during the winter months. The channel water is frozen solid at times.

Diversions.—During the irrigation season the greater part of the flow of the stream is diverted above the station.

Accuracy.—Fair. Gage heights before July 28 were affected by backwater from a beaver dam below the gage. After July 28 the records are considered good.

Discharge measurements of North Fork of Powder River near Kaycee, Wyo., for 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 11	W. A. Lamb	4.72	45
June 20	R. Richards	4.08	6.8
July 29[a]	B. E. Jones	3.25	0.92
Sept. 8[a]	R. Richards	3.51	12.9

[a] New gage 300 feet below old station.

Daily gage height, in feet, of North Fork of Powder River near Kaycee, Wyo., for 1911.

[Jacob Affalter, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	4.50	4.00	3.80	3.32	4.30	3.70	16	5.45	4.15	4.00	3.32	3.30	3.58	3.90
2	......	4.45	4.15	3.40	3.32	4.00	3.70	17	4.81	4.20	4.00	3.35	3.30	3.60	3.90
3	......	4.42	4.10	3.30	3.35	4.00	3.75	18	4.66	4.20	4.00	3.30	3.30	3.68	3.90
4	......	4.36	4.08	3.30	3.35	3.80	3.85	19	4.54	4.15	4.00	3.35	3.30	3.70	3.90
5	......	4.35	4.00	3.30	3.35	3.70	3.85	20	4.55	4.10	4.05	3.40	3.30	3.70	3.90
6	......	4.08	4.05	3.40	3.35	3.60	3.82	21	4.54	4.10	4.00	3.40	3.30	3.70	3.90
7	......	3.95	4.00	3.30	3.30	3.60	3.80	22	4.50	4.10	4.00	3.40	3.30	3.70	3.90
8	......	3.88	4.00	3.30	3.30	3.60	3.80	23	4.54	4.00	......	3.32	3.30	3.70	3.85
9	......	3.85	4.05	3.20	3.30	3.60	3.80	24	4.50	4.00	......	3.35	3.40	3.70	3.85
10	......	3.85	4.00	3.20	3.30	3.60	3.70	25	4.45	4.00	......	3.32	3.45	3.70	3.80
11	4.72	4.06	4.00	3.30	3.30	3.58	3.80	26	4.50	4.00	......	3.35	3.45	3.70	3.80
12	4.52	4.10	4.00	3.30	3.30	3.58	3.90	27	4.58	4.10	......	3.38	3.45	3.68	3.80
13	4.50	3.98	4.00	3.30	3.30	3.58	3.90	28	4.60	4.10	3.25	3.30	3.50	3.68	3.80
14	4.51	4.08	4.00	3.40	3.30	3.58	3.85	29	4.58	4.05	3.25	3.30	3.60	3.68	3.80
15	5.18	4.15	4.00	3.30	3.30	3.58	3.85	30	4.78	4.00	3.30	3.30	3.60	3.70	3.80
								31	4.56	......	4.00	3.32	......	3.70	......

CLEAR CREEK NEAR BUFFALO, WYO.

Location.—In the Bighorn National Forest, at Camp Comfort, in the SW. ¼ sec. 8, T. 50 N., R. 83 W., 11 miles west of Buffalo; three-fourths of a mile below the junction of the North and South forks.

Records available.—October 22, to December 31, 1911. From May 1, 1896, to March 11, 1900, a station was maintained by the State engineer at a point 4 miles west of Buffalo, where a measuring flume was built. From October 24, 1902, to December 31, 1904, a station was maintained at Buffalo. The records at the two points are not directly comparable, as a number of irrigation ditches divert water between and a few intermittent tributaries enter.

Drainage area.—110 square miles (measured from topographic sheets.)

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no diversions above the station and the records at this point represent the natural run-off. Below the station, however, there were adjudicated diversions amounting to 333 second-feet prior to July 1, 1912.

Accuracy.—Owing to a lack of discharge measurements no estimates of flow have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. B. Waha.

October 22, 1911: Gage height, .90 feet; discharge, 26 second-feet.

Daily gage height, in feet, of Clear Creek near Buffalo, Wyo., for 1911.

[A. Hettinger, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	......	......	......	11	......	......	......	21	......	......	......
2	......	......	......	12	......	.90	......	22	.95	......	......
3	......	......	.96	13	......	......	......	23	......	......	......
4	......	......	......	14	......	......	......	24	......	......	1.30
5	......	.88	......	15	......	......	......	25	......	......	......
6	......	......	......	16	......	......	......	26	......	1.05	......
7	......	......	......	17	......	......	1.60	27	......	......	......
8	......	......	......	18	......	......	......	28	......	......	......
9	......	......	......	19	......	1.00	......	29	.80	......	......
10	......	......	1.00	20	......	......	......	30	......	......	......
								31	......	......	1.00

NOTE.—Ice caused backwater Nov. 5 to Dec. 31.

CLEAR CREEK AT BUFFALO, WYO.

Location.—At concrete bridge at Buffalo, Wyo.

Records available.—May, 1896, to March 11, 1900; October 24, 1902, to November 30, 1904; May 8 to December 31, 1911. The records from May, 1896, to March 11, 1900, were obtained at a point 4 miles above Buffalo. All records since November 30, 1904, have been obtained at Buffalo.

Drainage area.—Not measured.

Gage.—Staff; set at a different datum from the gage used October 24, 1902, to November 30, 1904, but approximately the same site.

Channel.—Practically permanent; bed of stream is composed of cobblestones and firm gravel.

Discharge measurements.—Made from bridge at high stages and by wading at low stages.

Winter flow.—Gage heights affected by ice during the winter months.

Diversions.—The flow of the stream is appropriated and a large part is diverted for irrigation above the gage.

Discharge measurements of Clear Creek at Buffalo, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 8	W. A. Lamb	1.90	55
June 21	Raymond Richards	2.49	178
July 30	B. E. Jones	1.28	12.6
Sept. 9	Raymond Richards	1.22	12.8

Daily gage height, in feet, of Clear Creek at Buffalo, Wyo., for 1911.

[John H. Rice, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	2.8	1.4	1.3	1.25	1.2	1.15	16	2.85	3.4	1.45	1.2	1.25	1.15	......
2	......	3.0	1.3	1.35	1.25	1.25	1.25	17	2.65	2.85	1.75	1.25	1.2	1.2	......
3	......	2.55	1.2	1.35	1.2	1.2	1.15	18	2.45	......	1.7	1.3	1.15	1.05	......
4	......	2.5	1.2	1.4	1.25	1.15	1.15	19	2.15	2.5	1.4	1.3	1.2	......	......
5	......	2.5	1.2	1.35	1.2	1.2	1.3	20	1.95	2.55	1.55	1.25	1.15	......	......
6	......	2.4	1.2	1.4	1.25	1.2	1.3	21	1.9	2.6	1.45	1.25	1.15	......	......
7	......	2.35	1.1	1.4	1.2	1.25	1.3	22	1.8	2.5	1.5	1.3	1.2	......	......
8	1.9	2.6	1.2	1.4	1.25	1.2	1.3	23	1.8	2.3	1.55	1.25	1.15	1.15	......
9	2.2	2.45	1.2	1.35	1.2	1.25	......	24	1.95	2.2	1.45	1.3	1.2	1.15	......
10	2.2	2.3	1.15	1.35	1.2	1.2	......	25	2.2	2.0	1.4	1.25	1.15	1.2	......
11	1.95	2.2	1.2	1.4	1.25	1.15	......	26	2.5	1.9	1.4	1.3	1.2	1.2	......
12	1.85	2.3	1.15	1.35	1.2	1.2	......	27	2.4	1.75	1.3	1.25	1.15	......	......
13	1.9	2.7	1.2	1.3	1.25	1.15	......	28	2.1	1.6	1.3	1.3	1.2	......	......
14	2.05	2.8	1.25	1.3	1.2	1.15	......	29	1.9	1.5	......	1.25	1.15	......	......
15	3.35	3.3	1.35	1.3	1.2	1.2	......	30	1.9	1.3	1.3	1.3	1.15	......	......
								31	2.0	......	1.3	1.25	......	1.25	......

NOTE.—Gage heights distorted by ice Nov. 5 to 8.

Daily discharge, in second-feet, of Clear Creek at Buffalo, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	285	18	14	12	10	8.5	16	302	505	20	10	12	8.5	......
2	......	355	14	16	12	12	12	17	232	302	40	12	10	10	......
3	......	198	10	16	10	10	8.5	18	165	241	36	14	8.5	5.5	......
4	......	180	10	18	12	8.5	8.5	19	91	180	18	14	10	6.0	......
5	......	180	10	16	10	10	......	20	60	198	26	12	8.5	7.0	......
6	......	150	10	18	12	10	......	21	54	215	20	12	8.5	7.0	......
7	......	138	7	18	10	12	......	22	44	180	23	14	10	8.0	......
8	54	215	10	18	12	10	......	23	44	125	26	12	8.5	8.5	......
9	101	165	10	16	10	12	......	24	60	101	20	14	10	8.5	......
10	101	125	8.5	16	10	10	......	25	101	66	18	12	8.5	10	......
11	60	101	10	18	12	8.5	......	26	180	54	18	14	10	10	......
12	49	125	8.5	16	10	10	......	27	150	40	14	12	8.5	10	......
13	54	250	10	14	12	8.5	......	28	81	29	14	14	10	10	......
14	74	285	12	14	10	8.5	......	29	54	23	14	12	8.5	11	......
15	485	465	16	14	10	10		30	54	14	14	14	8.5	11	......
								31	66	......	14	12	......	12	......

Monthly discharge of Clear Creek at Buffalo, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	485	44	98.9	6,080	C.
June	505	14	183	10,900	B.
July	40	7	16.1	990	B.
August	18	10	14.4	885	B.
September	12	8.5	10.1	601	B.
October	12	5.5	9.45	581	B.
November	....	....	[a] 8.00	476	D.
December	....	....	[a] 6.00	369	D.
The period	....	....	....	20,900	

[a] Estimated.

NOTE.—Discharge May 1 to 7 estimated at 50 second-feet.

NOTE.—Daily discharge determined from a fairly well defined rating curve; discharge interpolated for days on which gage heights are missing.

PINEY CREEK AT KEARNEY, WYO.

Location.—At highway bridge 300 yards south of the post office at Kearney, Wyo.

Records available.—September 6, 1902, to June 30, 1906; May 13 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain gage on highway bridge. The gage used from September 6, 1902, to June 30, 1906, was at the same site but at a different datum.

Channel.—Liable to change; bed composed of gravel and cobblestones. Current swift at high and medium stages.

Discharge measurements.—At high stages measurements are made from the bridge and at low stages by wading.

Diversions.—The greater part of the flow of this stream during the irrigation season is diverted for irrigation above the gage.

Discharge measurements of Piney Creek at Kearney, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 13	W. A. Lamb	2.10	84
June 18	R. Richards	2.05	93
July 27	B. E. Jones	1.52	20
Sept. 9	R. Richards	1.37	17.8

Daily gage height, in feet, of Piney Creek at Kearney, Wyo., for 1911.

[Mrs. R. D. Noyce, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	3.15	1.70	1.67	1.22	1.30	1.68	16	3.15	3.00	1.42	1.38	1.30	1.28	......
2	......	3.00	1.68	1.61	1.22	1.32	1.62	17	3.00	2.45	1.42	1.38	1.30	1.30	......
3	......	2.75	1.70	1.74	1.22	1.32	1.60	18	2.75	2.20	1.65	1.38	1.30	1.30	......
4	......	2.75	1.58	1.71	1.19	1.30	1.60	19	2.55	2.15	1.62	1.36	1.30	1.30	......
5	......	2.70	1.55	1.71	1.17	1.30	1.60	20	2.52	2.30	1.62	1.36	1.30	1.30	......
6	......	2.45	1.55	1.69	1.25	1.30	1.60	21	2.38	2.30	1.60	1.33	1.30	1.25	......
7	......	2.28	1.55	1.69	1.27	1.30	1.65	22	2.32	2.15	1.60	1.30	1.30	1.25	......
8	......	2.45	1.52	1.69	1.27	1.30	1.70	23	2.20	2.00	1.55	1.33	1.30	1.75	......
9	......	2.55	1.50	1.67	1.30	1.30	......	24	2.40	1.95	1.50	1.33	1.30	1.65	......
10	......	2.20	1.50	1.54	1.30	1.25	......	25	2.50	1.85	1.50	1.33	1.30	1.65	......
11	......	1.95	1.42	1.54	1.25	1.20	......	26	2.75	1.75	1.50	1.33	1.30	1.65	......
12	......	2.10	1.40	1.49	1.30	1.20	......	27	2.50	1.65	1.50	1.32	1.30	1.65	......
13	......	2.21	1.40	1.44	1.30	1.20	......	28	2.45	1.70	1.42	1.29	1.30	1.60	......
14	2.40	2.28	1.40	1.40	1.30	1.20	......	29	2.35	1.70	1.40	1.27	1.30	1.60	......
15	3.55	2.37	1.40	1.38	1.30	1.30	......	30	2.35	1.62	1.42	1.27	1.32	1.60	......
								31	2.50	......	1.58	1.22	......	1.60	......

Daily discharge, in second-feet, of Piney Creek at Kearney, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	395	39	36	8.8	12	37	16	395	330	18	16	12	11	......
2	......	330	37	31	8.8	13	32	17	330	160	18	16	12	12	......
3	......	240	39	43	8.8	13	30	18	240	110	34	16	12	12	......
4	......	240	29	40	7.6	12	30	19	182	100	32	15	12	12	......
5	......	225	26	40	6.8	12	30	20	175	130	32	15	12	12	......
6	......	160	26	38	10	12	30	21	146	130	30	14	12	10	......
7	......	126	26	38	11	12	34	22	134	100	30	12	12	10	......
8	......	160	24	38	11	12	39	23	110	74	26	14	12	44	......
9	......	182	23	36	12	12	......	24	150	68	23	14	12	34	......
10	......	110	23	26	12	10	......	25	170	55	23	14	12	34	......
11	......	68	18	26	10	8	......	26	240	44	23	14	12	34	......
12	......	90	17	22	12	8	......	27	170	34	23	13	12	34	......
13	......	112	17	19	12	8	......	28	160	39	18	12	12	30	......
14	150	126	17	17	12	8	......	29	140	39	17	11	12	30	......
15	596	144	17	16	12	12	......	30	140	32	18	11	13	30	......
								31	170	......	29	9	......	30	......

NOTE.—Daily discharge determined from a rating curve that is fairly well defined below 150 second-feet.

Monthly discharge of Piney Creek at Kearney, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 14-31	596	110	211	7,530	C.
June	395	32	138	8,210	B.
July	39	17	24.9	1,530	B.
August	43	9	22	1,350	B.
September	13	6.8	11.2	666	B.
October	44	8	17.5	1,080	B.
November 1-8	39	30	32.8	520	B.
The period				20,900	

LITTLE MISSOURI RIVER BASIN.

LITTLE MISSOURI RIVER NEAR ALZADA, MONT.

Location.—At Walker's ranch, 2 miles below the mouth of Thompson Creek, near the southwest corner of T. 8 N., R. 60 E., 300 yards below a proposed dam site and 4 miles below Alzada, Mont. Alzada is most conveniently reached by stage or by automobile from Belle Fourche, S. Dak.

Records available.—April 30, 1904, to November 30, 1906; June 18 to December 31, 1911.

Drainage area.—About 780 square miles.

Gage.—Vertical staff on left bank.

Channel.—May shift during high water. Stream, sluggish; banks cut 5 to 15 feet in the sandy soil.

Discharge measurements.—At ordinary stages made by wading; at flood stages must be measured by making one measurement of the Little Missouri from the bridge at Alzada and one of Thompson Creek from the bridge 2 miles above its mouth, and adding the results.

Winter flow.—Probably affected by ice.

The following discharge measurement was made by Mahon and Heidel:

June 18, 1911: Gage height, 0.6 foot; discharge estimated, 1.5 second-feet.

Daily gage height, in feet, of Little Missouri River near Alzada, Mont., for 1911.

[John Walker, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1....	......	0.55	−0.25	0.6	0.45	0.55	0.7	16....	......	0.05	0.7	2.45	0.35	0.55	0.6
2....	......	.55	− .25	.6	.45	.5	.7	17....	......	.05	.6	1.25	.3	.55	.65
3....	......	.5	− .25	.55	.5	.5	.7	18....	0.6	.0	.55	1.0	.3	.6	.65
4....	......	.5	− .25	.55	.5	.55	.7	19....	.6	.0	3.8	.9	1.1	.65	.65
5....	......	.45	− .25	.5	.45	.6	.65	20....	.5	−.05	3.95	.75	.9	.7	.65
6....	......	.4	− .25	.5	.5	.6	.6	21....	.5	−.05	3.15	.7	.85	.7	.65
7....	......	.4	− .25	.7	.45	.55	.55	22....	.9	−.1	1.45	.6	.8	.7	.7
8....	......	.3	2.75	.7	.45	.5	.5	23....	.95	−.1	1.1	.6	.7	.7	.7
9....	......	.3	3.1	.75	.45	.55	.5	24....	.8	−.15	1.0	.55	.6	.75	.7
10....	......	.3	1.45	.75	.45	.55	.6	25....	.6	−.2	1.1	.55	.6	.75	.7
11....	......	.2	1.2	.9	.45	.55	.6	26....	.5	−.2	1.05	.5	.6	.7	.7
12....	......	2	.8	.8	.45	.55	.6	27....	.8	−.2	.9	.45	.55	.7	.7
13....	......	.2	.6	.7	.45	.55	.6	28....	.7	−.2	.75	.5	.55	.7	.7
14....	......	.1	1.0	1.6	.4	.55	.6	29....	.7	−.2	.65	.5	.55	.7	.7
15....	......	.1	.8	2.4	.35	.55	.6	30....	.6	−.25	.65	.45	.55	.7	.7
								31....	......	−.25	.65	......	.55	......	.7

NOTE.—Gage height Nov. 18 to Dec. 31 distorted by ice.

KNIFE RIVER BASIN.

KNIFE RIVER NEAR BRONCHO, N. DAK.

Location.—At C. D. Smith's ranch, in the SE. ¼ sec. 4, T. 142 N., R. 90 W., at the former site of the post office of Broncho; the present post office is about 6 miles from the old site. Spring Creek enters about 15 miles below the station and Elm Creek one-half mile above.

Records available.—May 29, 1903, to December 31, 1911.

Drainage area.—1,260 square miles; the drainage area at the present site is practically the same as at the original site, 2 miles farther downstream, the area at the lower point being perhaps 5 square miles greater.

Gage.—Chain, on left bank just below observer's house; datum unchanged since March 23, 1905, when the station was moved from the original site about 2 miles farther downstream.

Channel.—Practically permanent.

Discharge measurements.—At high stages made from car and cable 500 feet below gage; at low stages by wading.

Winter flow.—Affected by ice.

Accuracy.—Sufficient discharge measurements at high stages have not yet been made to satisfactorily check the rating curve.

Discharge measurements of Knife River near Broncho, N. Dak., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 8	J. W. Bliss	3.76	21
Aug. 16	E. F. Chandler	3.90	26

Daily gage height, in feet, of Knife River near Broncho, N. Dak., for 1911.

[C. D. Smith, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		3.9	3.8	4.7	4.1	3.4	3.5	3.5
2		4.0	3.7	4.45	4.5	3.4	3.5	3.5
3		4.0	3.7	7.6	3.9	3.5	3.5	3.5
4		4.2	3.7	6.5	3.8	3.6	3.5	3.5
5		4.2	3.6	7.4	3.8	3.5	4.2	3.5
6		4.4	3.6	5.8	3.8	3.5	5.5	3.5
7		4.4	3.6	4.7	3.8	3.5	5.1	3.5
8		4.3	3.6	4.3	3.8	5.1	5.0	3.5
9		4.3	3.6	4.1	3.7	4.4	5.7	3.5
10		4.3	3.6	4.0	3.6	4.7	5.8	3.5
11		4.0	3.6	4.0	3.5	4.7	5.2	3.5
12		3.9	3.6	4.0	3.4	4.8	4.9	3.5
13		3.9	3.5	4.0	3.4	4.4	4.4	3.8
14		4.2	3.5	4.0	3.3	4.4	4.1	3.7
15		4.3	3.5	4.0	3.3	4.7	4.1	3.7
16		4.1	3.5	3.9	3.3		4.0	3.6
17		3.9	3.5	3.9	3.3	4.8	3.9	3.6
18		3.9	3.4	4.0	3.3	4.9	3.9	3.8
19		3.9	3.4	4.0	3.3	4.4	3.8	4.0
20	5.9	3.9	3.4	3.9	3.3	3.8	3.6	4.0
21	6.0	3.9	3.4	3.7	3.3	3.7	3.6	3.8
22	6.4	3.9	3.4	3.7	3.3	3.5	3.6	3.7
23	5.2	3.8	3.5	3.7	3.3	3.5	3.6	3.6
24	5.2	3.8	3.9	4.45	3.3	3.5	3.6	3.6
25	4.8	3.8	3.9	3.75	3.3	3.5	3.6	3.6
26	4.6	3.8	3.8	3.7	3.3	3.5	3.5	3.6
27	4.5	3.9	3.7	3.7	3.3	3.5	3.5	3.6
28	4.3	3.9	3.5	3.7	3.3	3.5	3.5	3.6
29	4.3	3.8	3.5	3.6	3.3	3.5	3.5	3.6
30	4.1	3.8	3.9	3.6	3.3	3.5	3.5	3.6
31	4.0		4.0		3.3	3.5		3.6

Daily discharge, in second-feet, of Knife River near Broncho, N. Dak., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	31	24	119	40	4	7	7
2	....	39	18	86	82	4	7	7
3	....	39	18	641	25	7	7	7
4	....	58	18	411	19	10	7	7
5	....	58	13	597	19	7	49	7
6	....	80	13	197	19	7	230	7
7	....	80	13	108	19	7	166	7
8	....	69	13	59	19	166	151	7
9	....	69	13	40	14	70	264	7
10	....	69	13	32	10	108	282	7
11	....	39	13	32	7	108	181	7
12	....	31	13	32	4	122	136	7
13	....	31	9	32	4	70	70	19
14	....	58	9	32	2	70	40	14
15	....	69	9	32	2	108	40	14
16	....	48	9	25	2	115	32	10
17	....	31	9	25	2	122	25	10
18	....	31	6	32	2	136	25	19
19	....	31	6	32	2	70	19	32
20	316	31	6	25	2	19	10	32
21	335	31	6	14	2	14	10	19
22	411	31	6	14	2	7	10	14
23	194	24	9	14	2	7	10	10
24	194	24	31	76	2	7	10	10
25	133	24	31	16	2	7	10	10
26	105	24	24	14	2	7	7	10
27	92	31	18	14	2	7	7	10
28	69	31	9	14	2	7	7	10
29	69	24	9	10	2	7	7	10
30	48	24	31	10	2	7	7	10
31	39	....	39	....	2	7	....	10

NOTE.—Daily discharge determined from rating curves as follows: Mar. 20 to June 2, curve poorly defined; June 3 to Oct. 31 (1905 to 1910 curve), fairly well defined.

Monthly discharge of Knife River near Broncho, N. Dak., for 1911.

[Drainage area, 1,260 square miles.]

Month.	Discharge in second-feet.				Run-off		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			5.0	0.0040	0.005	307	
February			4.0	.0032	.003	222	
March	411		83.1	.066	.08	5,110	C.
April	80	24	42.0	.033	.04	2,500	C.
May	31	6	14.8	.012	.01	910	C.
June	641	10	92.8	.074	.08	5,520	B.
July	82	2	10.2	.0081	.009	627	B.
August	166	4	45.6	.036	.04	2,800	B.
September	282	7	61.1	.048	.05	3,640	B.
October	32	7	11.5	.0091	.01	707	B.
November			8.0	.0064	.007	476	
December			5.0	.0040	.005	307	
The year			31.9	.025	.34	23,100	

NOTE.—Means for January, February, November, and December estimated; discharge Mar. 1 to 15 estimated at 30 second-feet.

HEART RIVER BASIN.

HEART RIVER NEAR RICHARDTON, N. DAK.

Location.—In or near sec. 21, T. 138 N., R. 92 W., about 11 miles south of Richardton, opposite the observer's house, which is 1 mile below the highway bridge at which the station was formerly maintained.

Records available.—May 18, 1903, to September 30, 1911.

Drainage area.—1,250 square miles.

Gage.—Readings in 1911, up to September 4, were obtained from a staff gage set in the margin of the channel at the ford about 30 rods above observer's house and about 1 mile below the highway bridge. This staff gage and the chain gage at the highway bridge were found to give identical readings until about May 15, when slides into the river below the highway bridge caused the gage heights at highway bridge to be worthless. On September 4, 1911, an overhanging chain gage was installed opposite the observer's house, its zero being set so that a reading of 3.3 on the rod gage 30 rods above is 23.3 on the chain gage. On account of a beaver dam below the gage, readings during October are uncertain.

Channel.—Not permanent.

Discharge measurements.—At high stages, made from bridge; at ordinary and low stages, by wading.

Winter flow.—Affected by ice.

Accuracy.—Sufficient high and medium stage measurements have not yet been made to define the upper part of the rating curve.

Discharge measurements of Heart River near Richardton, N. Dak., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 9	J. W. Bliss	[a] 3.90	29.2
Aug. 14	E. F. Chandler	3.49	2.0
Sept. 4	.....do	[b] 3.27 [c] 23.27	0.05

[a] Ice present.

[b] From old staff gage.

[c] From new chain gage.

Daily gage height, in feet, of Heart River near Richardton, N. Dak., for 1911.

[W. F. Church, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	....	4.1	3.8	4.0	3.8	3.3	3.3
2	....	4.0	3.8	3.9	3.8	3.3	3.3
3	....	4.0	3.8	3.9	3.7	3.3	3.3
4	....	4.0	3.8	4.5	3.7	3.4	[a] 23.3
5	....	4.0	3.7	5.4	3.6	3.4	23.35
6	....	3.9	3.7	4.7	3.6	4.0	23.4
7	....	3.9	3.7	4.45	3.5	3.9	23.4
8	....	3.9	3.7	4.3	3.5	3.9	23.4
9	....	3.9	3.7	4.1	3.5	3.8	23.65
10	4.6	3.8	3.7	4.1	3.5	3.8	23.95
11	4.7	3.9	3.7	4.0	3.5	3.7	23.82
12	4.8	3.9	3.7	4.0	3.4	3.6	24.25
13	4.8	4.0	3.7	3.9	3.4	3.6	24.28
14	4.9	4.0	3.7	3.9	3.4	3.6	24.28
15	5.0	4.1	3.7	3.9	3.4	3.6	24.18
16	5.1	4.1	3.8	3.9	3.4	3.5	24.10
17	5.2	4.0	3.8	3.8	3.4	3.5	24.00
18	5.3	4.0	3.8	3.8	3.3	3.5	24.00
19	5.7	4.0	3.8	3.8	3.3	3.5	23.95
20	5.0	3.9	3.8	3.8	3.3	3.5	23.90
21	4.9	3.9	3.8	3.8	3.3	3.4	23.85
22	4.5	3.9	3.9	3.7	3.3	3.4	23.80
23	4.5	3.9	4.0	3.7	3.3	3.4	23.72
24	4.5	3.9	3.9	3.7	3.3	3.4	23.70
25	4.5	3.9	3.9	3.7	3.3	3.4	23.70
26	4.6	3.9	3.9	3.6	3.3	3.4	23.65
27	4.6	3.9	3.9	3.6	3.3	3.4	23.65
28	4.5	3.9	3.9	3.6	3.3	3.4	23.60
29	4.5	3.9	3.8	3.5	3.3	3.3	23.60
30	4.2	3.8	3.8	4.0	3.3	3.3	23.55
31	4.1	....	3.8	....	3.3	3.3	....

[a] New gage Sept. 3, 1911.

CANNONBALL RIVER BASIN.

CANNONBALL RIVER NEAR STEVENSON, N. DAK.

Location.—On the west side of the river near the south side of sec. 23, T. 133 N., R. 82 W., at M. H. Burdick's house, immediately above the ford, about 1 mile southeast of the Stevenson schoolhouse and about 5 miles above Timmer, N. Dak. This station is about 1 mile above the gage at the old Stevenson station, at which observations are still occasionally made.

Records available.—June 10, 1903, to November 30, 1908; August 9 to December 31, 1911.

Drainage area.—3,670 square miles.

Gages.—Standard chain on projecting cantilever timber; a temporary rod gage on the left bank was used until the chain gage was ready.

Channel.—Bed of stream composed of gravel and stones, in places covered with silt to the depth of 1 foot. At the rapids 600 feet below the gage the bed is of clean gravel and stones. During floods the silt may be washed away and later redeposited at some points.

Discharge measurements.—At low and medium stages made by wading at the ford 15 rods below the gage or at the riffle 55 rods below; at medium and high stages measurements may be made by use of the car and cable at the old Stevenson station, about 1 mile farther downstream. The discharge is practically the same at the two points, except that a small draw, which enters midway between the gage and the cable on the north side, carries a small flow for a few hours after a rain.

Winter flow.—Affected by ice.

Discharge measurements of Cannonball River near Stevenson, N. Dak., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 23	Joy W. Bliss	3.48	94
Aug. 9	E. F. Chandler	3.32	74
Sept. 5[a]	.....do	12.63	2.0
Nov. 3[a]	Geo. Ebner	12.71	1.6

[a] New gage; different datum.

Daily gage height, in feet, of Cannonball River near Stevenson, N. Dak., for 1911.

Day.	Mar.	Apr.	Aug.	Sept.	Oct.	Nov.	Dec.
1		3.03		12.6	12.6	12.7	
2		3.03		12.6	12.6	12.7	
3		3.03		12.5	12.6	12.7	
4				12.6	12.6	12.7	
5				12.7	12.6	12.7	
6				13.3	12.6	12.7	12.9
7				13.5	12.6	12.7	
8				13.3	12.6	12.7	
9			13.6	13.0	12.6	12.8	
10			13.9	12.9	12.6	12.8	
11			13.75	12.8	12.6	12.7	
12			13.45	12.75	12.7	12.8	
13			13.3	12.8	12.7	12.8	
14			13.05	12.9	13.2	12.8	
15			13.0	12.8	13.0	12.8	
16			12.9	12.85	12.9	12.8	
17			12.8	12.8	12.9	12.8	
18			12.85	12.8	12.8	12.8	
19			12.85	12.75	12.8	12.8	
20			12.85	12.7	12.8	12.8	
21			12.8	12.7	12.7	12.9	
22	3.48		12.75	12.7	12.7		
23	3.56		12.7	12.65	12.7		
24	3.30		12.75	12.6	12.7		
25	3.05		12.7	12.6	12.7		13.5
26	3.05		12.7	12.6			
27	3.05		12.65	12.6	12.7		
28	3.04		12.7	12.6	12.7		
29	3.04		12.65	12.6	12.7		
30	3.04		12.65	12.6	12.65		
31	3.04		12.65		12.6		

GRAND RIVER BASIN.

NORTH BRANCH OF GRAND RIVER AT HALEY, N. DAK.

Location.—About 20 rods south of the post office at Haley, N. Dak., near the northeast corner of sec. 36, T. 129 N., R. 100 W.

Records available.—May 17, 1908, to December 31, 1911.

Drainage area.—500 square miles.

Gage.—Staff.

Channel.—Bed of stream composed of gravel and silt.

Discharge measurements.—At high stages made from car and cable 200 feet below gage; at low stages by wading.

Winter flow.—Affected by ice.

Accuracy.—The gage heights obtained at this station are not of sufficient value to publish as the observer did not read the gage so long as there was no visible change in the flow, but recorded the same gage height day after day. However, he states that he kept close watch of the stream and that there was no perceptible change during the spring until the last of June, when it dropped suddenly about 0.2 in gage height, as he had recorded. The flow during the rest of the season after August 13, when a hydrographer visited the station, probably varied only slightly.

Discharge measurements of North Branch of Grand River at Haley, N. Dak., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 6	J. W. Bliss	1.00	2.27
Aug. 13	E. F. Chandler	0.66	0.16

GRAND RIVER NEAR WAKPALA, S. DAK.

Location.—At the new steel highway bridge 4 miles south of Wakpala, S. Dak., a station on the Chicago, Milwaukee & Puget Sound Railway, in or near sec. 8, T. 19 N., R. 29 E.

Records available.—September 9 to December 31, 1911.

Drainage area.—5,300 square miles.

Gage.—Standard chain on the foot-guard rail at the downstream side of the bridge.

Channel.—Probably shifts somewhat; bed composed of sand; current medium; banks steep.

Discharge measurements.—Made from highway bridge; at very low stages measurements may be made by wading at the ford 40 rods below the bridge.

Discharge measurements of Grand River near Wakpala, S. Dak., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 9	E. F. Chandler	2.73	11.8
Nov. 2	Geo. Ebner	2.52	2.3

WHITE RIVER BASIN.

WHITE RIVER NEAR INTERIOR, S. DAK.

Location.—At the steel highway bridge near the southwest corner of sec. 7, T. 4 S., R. 18 E., where the county line between Stanley and Pennington counties intersects White River, 3 miles southwest of Interior, S. Dak., a station on the Chicago, Milwaukee & St. Paul Railway.

Records available.—June 24, 1904, to November 30, 1906, at old station in T. 3 S., R. 18 E.; August 24 to November 30, 1911.

Drainage area.—4,090 square miles. The area above the present site is about 15 square miles less than the area above the station maintained during 1904–1906 near Westover.

Gage.—A vertical rod attached to the lower side of the first pier (nearest the shore) at the left end of the bridge, installed August 31, 1911, and supposed to read the same as the temporary rod gage which was placed August 24 on a tree on the left bank at the turn of the river near the southwest corner of NW. ¼ sec. 17.

Channel.—Probably changes gradually; bed composed of sand and some quicksand; left bank steep and clean; right bank gently sloping and clean; current, medium. At low stages all the water may pass under one span (67-foot); at the highest stage the water passes under two 67-foot spans and 120 feet of trestle approach, but probably two-thirds of the flow passes under the two spans.

Discharge measurements.—Made from the highway bridge.

Discharge measurements of White River near Interior, S. Dak., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 24	E. F. Chandler	10.46	5,548
31	.....do	3.66	38.3
Nov. 10	Gorie Monley	3.75	93

Daily gage height, in feet, of White River near Interior, S. Dak., for 1911.

[D. M. Waller, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Day.	Aug.	Sept.	Oct.	Nov.
1		3.65	4.7	4.1	16		5.2	5.6	4.1
2		3.65	4.65	4.0	17		5.15	5.1	4.6
3		3.7	4.0	5.8	18		5.05	4.3	4.75
4		3.75	4.5	5.7	19		5.0	4.5	4.8
5		3.8	4.7	5.6	20		4.9	5.5	4.9
6		9.2	4.7	5.55	21		4.7	4.8	5.0
7		7.0	4.7	4.0	22		4.65	4.65	5.3
8		7.5	4.65	4.0	23		4.7	4.5	5.2
9		6.4	4.65	4.05	24	10.5	4.85	4.4	4.8
10		6.35	4.7	4.1	25	8.2	4.8	4.4	4.7
11		6.0	4.7	4.1	26	5.2	4.75	4.1	4.75
12		5.6	4.7	4.1	27	3.9	4.7	5.4	4.8
13		5.45	4.75	4.1	28	3.7	4.8	4.0	5.0
14		5.3	4.75	4.1	29	3.7	4.75	4.1	4.8
15		5.25	4.9	4.1	30	3.65	4.7	4.15	4.7
					31	3.65		4.2	

WHITE RIVER AT WESTOVER, S. DAK.

Location.—Near the east side of sec. 32, T. 3 S., R. 29 E., 12 miles south and slightly east from Murdo, S. Dak., a station on the Chicago, Milwaukee & St. Paul Railway; about 1 mile below the entrance of Little White River.

Records available.—August 25 to December 31, 1911.

Drainage area.—7,850 square miles.

Gage.—A series of vertical rods. When the bridge is completed a permanent rod or chain gage will be placed.

Channel.—Likely to scour and fill in flood seasons; bed composed of sand and quicksand with some gravel and stones.

Discharge measurements.—At low stages made by wading at the ford near the gage; at higher stages by the use of the ferry cable and a boat.

Winter flow.—Affected by ice.

Discharge measurements of White River at Westover, S. Dak., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 25	E. F. Chandler	11.59	7,370
30	.....do	8.52	397
Nov. 8	Gorie Monley	8.35	135

NIOBRARA RIVER BASIN.

NIOBRARA RIVER AT NIOBRARA, NEBR.

Location.—At the Government highway bridge spanning the main channel in the SE. ¼ sec. 18, T. 32 N., R. 56 W., half a mile from the depot at Niobrara. The station is 1½ miles above the mouth. No tributaries enter below.

Records available.—August 19, 1910, to October 5, 1911. From May 11 to October 25, 1902, a station was maintained at a highway bridge 1 mile southwest of Niobrara.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Shifting and within the influence of backwater from Missouri River.

Discharge measurements.—Made from bridge.

Winter flow.—During the winter months ice causes backwater for short periods.

Diversions.—Prior to September 1, 1912, there were approved diversions of 561 second-feet for irrigation and 2,755 second-feet for power from Niobrara River above the station. There were also approved diversions of 180 second-feet for irrigation and 453 second-feet for power from tributaries entering above. In Wyoming there are adjudicated diversions of 24 second-feet from the Niobrara and tributaries.

Accuracy.—Owing to the shifting channel and insufficient discharge measurements, no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data are furnished.

Discharge measurements of Niobrara River at Niobrara, Nebr., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 31	A. A. Dobson	0.85	2,240	Aug. 4	A. B. Price	1.50	1,080
Apr. 26	A. B. Price	1.30	1,860	26	.....do	1.50	1,150
May 27	.....do	1.40	1,960	Sept. 25	.....do	1.40	1,100
June 22	.....do	1.40	1,140	Oct. 5	.....do	1.30	1,210

Daily gage height, in feet, of Niobrara River at Niobrara, Nebr., for 1911.

[A. F. Reid, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.9	1.8	1.4	......	1.3	1.2	1.3	16	......	1.6	1.4	1.3	1.4	1.5	1.5
2	1.0	1.6	1.3	1.1	1.3	1.3	1.4	17	......	1.0	1.4	1.3	1.4	1.4	1.4
3	1.1	1.6	1.3	1.1	1.4	1.3	1.3	18	......	.9	1.5	1.5	1.4	1.5	1.4
4	1.1	1.6	1.2	1.2	1.5	1.5	......	19	......	.9	1.4	1.5	1.5	1.6	1.5
5	1.2	1.5	1.3	1.3	1.5	1.5	1.3	20	......	1.0	1.3	1.5	1.5	1.6	1.3
6	1.3	1.5	1.3	1.3	1.5	1.6	......	21	......	1.2	1.3	1.5	1.4	1.5	1.4
7	1.1	1.5	1.4	1.2	1.6	1.5	......	22	......	1.2	1.5	1.4	1.4	1.4	1.4
8	1.1	1.5	1.4	1.2	1.6	1.5	......	23	......	1.2	1.5	1.4	1.4	1.5	1.4
9	1.0	1.5	1.3	1.4	1.7	1.4	......	24	......	1.2	1.4	1.3	1.5	1.5	1.4
10	.8	1.5	1.3	1.2	1.6	1.4	......	25	......	1.2	1.4	1.3	1.5	1.6	1.3
11	.9	1.4	1.3	1.2	1.6	1.4	......	26	......	1.3	1.4	1.4	1.5	1.5	1.4
12	.9	1.4	1.2	1.3	1.6	1.4	......	27	......	1.2	1.4	1.6	1.4	1.4	1.4
13	.9	1.4	1.2	1.3	1.5	1.3	......	28	......	1.2	1.3	1.4	1.3	1.5	1.4
14	.9	1.5	1.3	1.3	1.5	1.4	......	29	......	1.2	1.4	1.2	1.3	1.5	1.4
15	.8	1.4	1.4	1.4	1.5	1.4	......	30	......	1.4	1.2	1.0	1.3	1.4	1.3
								31	0.85	......	1.2	1.0	1.3	1.4	......

BIG SIOUX RIVER BASIN.

ROCK RIVER AT LUVERNE, MINN.

Location.—At the Rock Island Railroad bridge at Luverne, Minn., 3½ miles above the mouth of Elk Creek.

Records available.—August 23, 1911, to December 31, 1911.

Drainage area.—440 square miles.

Gage.—Vertical staff.

Channel.—Probably permanent; small rapids just below gage; severe floods will cause a change.

Discharge measurements.—Made from the railroad bridge at flood stage, from the highway bridge at medium stage, and at a wading section in low water.

Winter flow.—From December to March the river is frozen over at the station and measurements are made through the ice to determine the winter discharge.

Artificial control.—The flow of the river is not artificially controlled above Luverne, as there are no dams except a low rock dam a short distance above the station, which does not regulate the flow but simply raises the water level about 2 feet.

Cooperation.—Station maintained in cooperation with the State Drainage Commission.

Discharge measurements of Rock River at Luverne, Minn., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 23	Robert Follansbee	1.64	16.6
Sept. 23	S. B. Soulé	2.15	[a] 53.9
Dec. 10	C. J. Emerson	1.95	[b] 37

[a] Discharge does not include overflow channel, estimated flow about 10 second-feet.

[b] Overflow channel overlooked—may have been some flow.

Daily gage height, in feet, and discharge, in second-feet, of Rock River at Luverne, Minn., for 1911.

[C. W. Pinkerton, observer.]

Day.	Aug.		Sept.		Oct.		Nov.		Dec.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.5	13	1.9	32	2.40	81		
2			1.5	13	1.9	32	2.35	75		
3			1.5	13	1.9	32	2.30	69		
4			3.3	211	2.0	40	2.38	79	1.90	
5			2.75	130	2.2	58	2.32	71		
6			2.4	81	6.6	976	2.35	75		
7			2.0	40	7.0	1,080	2.40	81	1.90	
8			1.9	32	6.35	911	2.45	88		
9			1.9	32	5.4	667	2.50	95		
10			3.25	203	4.5	456	2.42	84	1.94	
11			3.5	246	3.8	303	2.35	75	1.92	
12			3.1	180	3.3	211	2.10	48	1.92	
13			2.45	88	3.5	246	2.30	69	1.90	
14			2.2	58	4.0	346	2.20	58	1.90	
15			2.1	48	3.5	246	2.15	53	1.92	
16			1.9	32	3.7	283	2.10	48	1.82	
17			1.9	32	4.9	547	2.05	44		
18			2.6	109	5.4	667	2.02	42	1.82	
19			2.9	151	5.2	618	2.00	40		
20			3.0	165	4.5	456	2.00	40		
21			2.9	151	4.0	346	2.00	40	1.80	
22			2.4	81	3.5	246	2.00	40		
23	1.6	16	2.2	58	3.2	195	1.90	32		
24	1.6	16	2.0	40	3.1	180	1.95			
25	1.6	16	2.0	40	2.95	158	1.90		1.80	
26	1.6	16	1.9	32	2.88	148	1.95			
27	1.6	16	1.9	32	2.8	137	1.95			
28	1.6	16	1.9	32	2.75	130			1.80	
29	1.6	16	1.8	25	2.7	123				
30	1.6	16	1.8	25	2.62	112	1.90			
31	1.5	13			2.6	109				

NOTE.—Relation of gage height to discharge affected by ice about Nov. 24 to Dec. 31. Daily discharge computed from a rating curve well defined between 16 and 346 second-feet (gage heights 1.6 and 4 feet). Discharge Nov. 25 to Dec. 31 estimated, because of ice, from observer's notes, climatologic records, and one discharge measurement; mean discharge Nov. 24 to 30 estimated 26 second-feet, varying from about 30 to 24 second-feet; mean discharge Dec. 1 to 31 estimated 23 second-feet, varying from about 37 to 10 second-feet.

Monthly discharge of Rock River at Luverne, Minn., for 1911.

[Drainage area, 440 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 23-31	16	13	15.7	0.036	0.01	B.
September	246	13	79.8	.181	.20	B.
October	1,080	32	326	.741	.85	B.
November	95		[a] 53.6	.122	.14	C.
December			[b] 23	.052	.06	D.

[a] Partially estimated.

[b] Estimated.

NOTE.—See footnotes to table of daily discharge.

PLATTE RIVER BASIN.

NORTH PLATTE RIVER AT SARATOGA, WYO.

Location.—At highway bridge in Saratoga, 2 miles below the mouth of Spring Creek.

Records available.—June 9, 1903, to October 31, 1906; April 1 to December 17, 1909; April 27 to November 10, 1911.

Drainage area.—2,920 square miles. Measured from Land Office maps.

Gage.—A chain gage was installed at the bridge in 1911. The original gage was a vertical staff located 100 yards below the bridge. The relation between the two gages has not been determined.

Channel.—Practically permanent, except that tie drives may cause backwater for a few days.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months, and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 86 second-feet, from the North Platte above Saratoga, in Wyoming, and 934 second-feet from tributaries entering above. In the Colorado portion of the drainage area there are adjudicated decrees for diversions of 3,060 second-feet from the headwaters of the North Platte.

Accuracy.—Conditions are favorable for accurate results and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of North Platte River at Saratoga, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 25	Fletcher and Kingdon..	5.00	1,560	June 10	R. H. Fletcher.........	7.69	6,780
May 4	.....do...................	5.15	1,640	19	.....do.................	7.22	5,710
29	R. H. Fletcher.........	6.40	4,090	July 10	.....do.................	5.10	1,440
June 1	.....do...................	7.04	5,280	Oct. 5	G. H. Russell..........	4.57	795

Daily gage height, in feet, of North Platte River at Saratoga, Wyo., for 1911.

[Garrett Price, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		5.5	6.9	5.3	4.21	3.73	4.31	4.0
2		5.25	7.6	5.3	4.16	3.73	4.31	3.9
3		5.2	7.3	5.45	4.11	3.73	4.41	3.85
4		5.15	7.4	5.6	4.01	3.79	4.31	3.85
5		5.3	7.4	5.5	3.96	3.81	4.30	4.0
6		5.8	7.3	5.35	3.96	3.81	4.95	3.95
7		6.0	7.3	5.35	4.01	3.71	4.8	3.65
8		6.4	[a]7.6	5.4	3.99	3.73	4.6	3.8
9		6.8	7.8	5.2	3.81	3.73	4.45	3.95
10		6.8	7.4	5.15	3.79	3.69	4.4	4.0
11		6.5	7.3	4.96	3.71	3.69	4.35	
12		6.4	7.2	4.79	3.73	3.66	4.2	
13		6.2	7.2	4.71	3.79	3.66	4.15	
14		6.3	7.3	4.71	3.79	3.69	4.1	
15		6.7	7.2	4.71	3.73	3.66	4.1	
16		6.8	7.4	4.61	3.71	3.66	4.1	
17		6.9	8.0	4.76	3.73	3.73	4.1	
18		6.8	7.8	4.73	3.86	3.61	4.1	
19		6.7	7.4	4.71	3.89	3.66	4.15	
20		6.5	7.3	4.79	3.89	3.66	4.05	
21		6.4	7.4	4.79	3.91	3.63	3.8	
22		6.3	7.4	4.73	3.93	3.61	3.85	
23		6.1	7.0	4.76	4.09	3.63	4.0	
24		6.3	6.5	4.76	4.11	3.66	4.15	
25	5.0	6.4	6.4	4.69	4.11	3.71	4.1	
26	5.2	6.8	6.2	4.53	4.06	3.81	4.1	
27	5.4	6.6	6.2	4.46	4.01	3.86	4.1	
28	5.5	6.4	5.8	4.41	3.91	3.81	4.0	
29	5.6	6.4	5.45	4.43	3.86	3.91	4.05	
30	5.6	6.6	5.45	4.33	3.81	4.01	4.05	
31		6.8		4.23	3.83		4.05	

[a] Maximum stage reached during this flood was at a gage height of 11 feet.

Daily discharge, in second-feet, of North Platte River at Saratoga, Wyo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		2,240	5,040	1,890	478	208	559	340
2		1,800	6,570	1,890	442	208	559	286
3		1,720	5,910	2,150	407	208	650	262
4		1,630	6,130	2,420	346	234	559	262
5		1,890	6,130	2,240	318	243	550	340
6		2,800	5,910	1,980	318	243	1,320	313
7		3,180	5,910	1,980	346	200	1,100	178
8		3,990	6,570	2,060	335	208	850	238
9		4,830	7,030	1,720	243	208	690	313
10		4,830	6,130	1,640	234	192	640	340
11		4,200	5,910	1,330	200	192	595	
12		3,990	5,690	1,090	208	182	470	
13		3,580	5,690	983	234	182	435	
14		3,780	5,910	983	234	192	400	
15		4,620	5,690	983	208	182	400	
16		4,830	6,130	862	200	182	400	
17		5,040	7,490	1,050	208	208	400	
18		4,830	7,030	1,010	267	164	400	
19		4,620	6,130	983	281	182	435	
20		4,200	5,910	1,090	281	182	370	
21		3,990	6,130	1,090	291	171	238	
22		3,780	6,130	1,010	302	164	262	
23		3,380	5,250	1,050	394	171	340	
24		3,780	4,200	1,050	407	182	435	
25	1,300	3,990	3,990	958	407	200	400	
26	1,720	4,830	3,580	773	376	243	400	
27	2,060	4,410	1,720	700	346	267	400	
28	2,240	3,990	2,800	650	291	243	340	
29	2,420	3,990	2,150	670	267	291	370	
30	2,420	4,410	2,150	577	243	346	370	
31		4,830		494	252		370	

NOTE.—Daily discharge determined from a rating curve that is fairly well defined above 750 second-feet.

Monthly discharge of North Platte River at Saratoga, Wyo., for 1911.

[Drainage area, 2,920 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April 25–30	2,420	1,300	2,030	0.695	0.16	24,200	B.
May	5,040	1,630	3,810	1.30	1.50	234,000	B.
June	7,490	1,720	5,370	1.84	2.05	320,000	B.
July	2,420	494	1,270	.435	.50	78,100	B.
August	478	200	302	.103	.12	18,600	C.
September	346	164	209	.072	.08	12,400	C.
October	1,320	238	507	.174	.20	31,200	C.
November 1–10	340	178	287	.098	.04	5,690	C.
The period						724,000	

NORTH PLATTE RIVER AT PATHFINDER, WYO.

Location.—Half a mile south of Pathfinder, 800 feet below the mouth of the canyon, in sec. 24, T. 29 N., R. 84 W. The nearest tributary is Canyon Creek, which enters 2 miles above.

Records available.—May 9, 1905, to December 3, 1911.

Drainage area.—About 12,000 square miles.

Gage.—Chain gage; datum unchanged.

Channel.—Condition not known, as only final results are furnished.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes slight backwater for short periods.

Controlled flow.—The Pathfinder dam, one-fourth mile above the station, forms a reservoir of 1,025,000 acre-feet capacity. This reservoir materially changes the natural run-off of the river, as is seen by a comparison with the records of inflow.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 58 second-feet from the North Platte between Saratoga and Pathfinder, and 1,550 second-feet from intervening tributaries. Near Whalen, 150 miles below, the water from the Pathfinder reservoir is diverted by the interstate canal and used to irrigate land in Nebraska and Wyoming. Further canals are contemplated by the Reclamation Service.

Cooperation.—Station maintained in cooperation with United States Reclamation Service, by which the records are furnished.

The following discharge measurement was made by H. D. Comstock:

May 25, 1911: Gage height, 3.40 feet; discharge, 1,640 second-feet.

Daily gage height, in feet, of North Platte River at Pathfinder, Wyo., for 1911.

[United States Reclamation Service Engineers, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.25	2.3	1.6	2.1	4.0	4.8	5.45	4.7	3.9	1.6	2.05	1.4
2	1.25	2.5	1.6	3.05	4.05	4.2	5.2	4.65	3.9	2.3	2.0	1.4
3	1.25	2.55	1.6	3.05	2.1	4.2	5.2	4.65	3.9	3.0	1.9	1.4
4	1.25	2.1	1.6	2.8	2.1	4.25	5.2	4.65	3.9	2.9	2.0	1.45
5	1.25	2.55	1.6	2.8	2.15	4.3	5.2	4.65	3.9	2.8	2.0	1.5
6	1.25	2.2	2.0	4.05	2.2	4.1	5.2	4.65	3.85	2.8	2.0	1.55
7	1.2	2.3	2.6	3.2	2.2	4.3	5.2	4.65	3.85	2.6	1.9	1.55
8	1.2	2.2	2.95	3.2	2.25	4.2	5.2	4.65	3.8	3.3	1.9	1.5
9	1.15	2.2	3.1	3.2	2.25	4.2	4.95	4.6	3.8	3.3	1.9	1.5
10	2.3	2.2	3.2	3.2	2.3	4.65	4.95	4.6	3.8	2.2	1.8	1.5
11	1.15	2.1	3.3	3.2	2.3	4.65	4.95	4.6	3.8	2.3	1.6	1.5
12	2.1	2.15	3.4	3.2	2.3	4.7	5.0	4.6	4.25	2.3	1.4	1.5
13	1.4	2.1	3.4	3.2	2.4	5.05	5.0	4.55	4.2	2.35	1.0	1.4
14	1.6	2.05	3.4	3.2	3.65	5.4	4.75	4.55	4.15	2.35	1.15	1.4
15	1.5	2.0	5.1	3.6	3.65	5.75	4.75	4.55	4.15	2.3	1.3	1.3
16	1.4	1.8	5.3	3.6	3.65	5.75	4.75	4.5	4.1	2.35	1.5	1.3
17	1.35	2.2	4.0	3.55	3.7	5.2	4.75	4.5	4.15	2.35	1.65	1.4
18	2.25	2.2	3.0	3.5	3.5	5.15	4.75	4.5	4.1	2.3	1.8	1.4
19	2.2	2.15	1.7	4.0	3.5	5.15	4.75	4.5	4.2	2.25	1.9	1.4
20	1.3	1.8	1.8	4.0	3.45	5.1	4.75	4.45	4.15	2.2	2.0	1.4
21	1.5	2.3	1.9	3.95	3.5	4.85	4.7	4.45	4.15	2.2	2.1	1.35
22	1.9	2.7	1.95	3.9	3.4	5.25	4.7	4.4	4.2	2.15	2.1	1.3
23	2.4	1.8	2.0	3.75	3.4	5.3	4.7	4.4	4.55	2.15	2.1	1.2
24	2.4	1.9	2.0	3.9	3.4	5.3	4.7	4.35	4.45	2.1	2.1	1.25
25	1.4	1.7	2.05	4.15	3.4	5.3	4.7	4.35	4.55	2.0	2.05	1.2
26	1.4	1.8	2.1	4.15	3.4	5.3	4.7	4.35	4.50	2.0	2.0	1.2
27	1.6	1.9	2.1	4.15	3.4	2.0	4.7	4.0	4.3	2.1	2.0	1.2
28	1.5	1.55	2.1	4.1	3.6	2.0	4.7	4.0	1.5	2.1	1.8	1.15
29	1.6	....	2.1	4.0	3.9	5.0	4.7	3.95	1.6	2.1	1.6	1.2
30	1.7	....	2.1	4.1	4.2	5.45	4.7	3.95	1.9	2.1	1.4	1.1
31	1.9	....	2.1	....	4.2	....	4.7	3.9	....	2.1	....	1.15

NOTE.—Ice present Jan. 23 and 24, Feb. 17 to 27, and Dec. 15 to 27.

Daily discharge, in second-feet, of North Platte River at Pathfinder, Wyo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	294	760	438	661	2,250	3,200	3,730	3,070	2,140	188	650	354
2	294	880	438	1,220	2,305	2,470	3,890	3,005	2,140	1,320	626	354
3	294	915	438	1,300	1,210	2,470	3,750	3,005	2,140	755	592	354
4	294	661	438	1,095	661	2,525	3,750	3,005	2,140	1,125	592	364
5	294	915	438	1,095	685	2,580	3,750	3,005	2,140	1,095	615	385
6	294	710	615	1,900	710	2,360	3,700	3,005	2,085	1,095	615	406
7	276	760	950	1,765	710	2,580	3,750	3,005	2,085	1,020	592	417
8	276	710	1,215	1,435	735	2,470	3,750	3,005	2,030	1,237	569	406
9	259	710	1,345	1,435	735	2,470	3,470	2,940	2,030	1,525	569	396
10	760	710	1,435	1,435	760	2,900	3,400	2,940	2,030	770	547	396
11	259	661	1,525	1,435	760	3,005	3,400	2,940	2,030	735	481	396
12	661	685	1,615	1,435	760	3,070	3,450	2,940	2,480	760	396	396
13	354	661	1,615	1,435	820	3,310	3,450	2,880	2,470	790	284	375
14	438	638	1,615	1,435	1,720	3,810	3,450	2,880	2,415	790	237	354
15	396	615	2,740	1,755	1,865	4,530	3,160	2,880	2,415	775	286	333
16	354	525	3,940	1,815	1,865	4,645	3,135	2,820	2,360	775	354	313
17	333	610	3,290	1,790	1,920	4,230	3,135	2,820	2,415	790	427	333
18	735	560	1,400	1,740	1,715	3,730	3,135	2,820	2,360	775	492	354
19	710	560	675	2,080	1,715	3,680	3,135	2,820	2,470	748	547	354
20	313	500	525	2,250	1,665	3,650	3,135	2,760	2,415	722	592	354
21	396	500	569	2,220	1,715	3,160	3,070	2,760	2,415	710	638	344
22	569	500	592	2,170	1,615	3,530	3,070	2,700	2,470	698	661	323
23	720	450	615	2,060	1,615	3,860	3,070	2,700	2,710	685	661	294
24	720	569	615	1,945	1,615	3,900	3,070	2,640	2,760	673	661	285
25	354	481	638	2,270	1,615	3,900	3,070	2,640	2,880	638	650	285
26	354	525	661	2,430	1,615	3,900	3,070	2,640	2,880	615	626	276
27	438	450	661	2,420	1,615	890	3,070	2,250	2,800	638	615	276
28	396	300	661	2,360	1,855	615	3,070	2,250	1,800	661	570	268
29	438	....	661	2,250	2,140	3,440	3,070	2,195	438	661	481	268
30	481	....	661	2,360	2,470	4,110	3,070	2,195	569	661	396	243
31	569	....	661	....	2,500	....	3,070	2,140	....	661	....	243

NOTE.—Daily discharge represents the outflow from the Pathfinder reservoir.

Monthly discharge of North Platte River at Pathfinder, Wyo., for 1911.

[Drainage area, 12,000 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	760	259	430	0.036	0.04	26,400
February	915	300	626	.052	.05	34,800
March	3,940	438	1,090	.091	.105	66,800
April	2,430	661	1,770	.147	.16	105,000
May	2,500	661	1,480	.124	.14	91,100
June	4,640	615	3,170	.264	.29	188,400
July	3,890	3,070	3,330	.278	.32	205,000
August	3,070	2,140	2,760	.230	.26	170,000
September	2,880	438	2,220	.185	.21	132,000
October	1,520	188	809	.067	.08	49,700
November	661	237	534	.044	.05	31,800
December	417	243	339	.028	.03	20,800
The year	4,640	188	1,550	.13	1.75	1,120,000

NOTE.—Table shows outflow from Pathfinder reservoir.

Daily inflow, in second-feet, to Pathfinder reservoir at Pathfinder, Wyo., for 1911.

[United States Reclamation Service engineers, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	334	1,085	554	1,260	3,150	5,200	2,380	570	398	760	560	354
2	334	930	438	1,230	3,180	5,950	2,070	525	428	760	510	354
3	334	865	438	1,120	3,080	6,060	1,950	548	359	900	435	354
4	334	479	443	1,770	2,800	6,840	2,200	576	294	1,030	642	406
5	334	1,066	492	2,000	2,490	6,700	2,200	526	318	1,095	681	385
6	334	544	685	3,300	2,500	6,600	2,400	412	302	1,260	615	502
7	316	785	1,320	2,100	2,210	6,990	2,220	353	246	894	380	417
8	316	780	2,320	2,670	3,080	7,040	2,240	422	226	1,870	614	310
9	299	760	2,000	1,820	4,100	7,530	2,190	420	256	1,440	569	396
10	400	760	2,500	1,815	5,150	8,090	1,890	485	397	1,350	501	396
11	459	611	3,200	1,450	5,320	9,080	1,680	633	337	1,350	356	492
12	461	670	2,770	1,450	5,600	8,570	1,310	646	378	948	209	300
13	354	616	2,540	1,450	5,410	6,920	945	415	438	1,010	128	375
14	438	658	2,250	1,360	4,270	6,700	955	488	688	795	277	354
15	396	596	1,180	1,050	4,500	6,630	1,010	342	681	684	372	290
16	354	490	763	872	4,780	7,180	1,010	357	378	664	384	313
17	333	610	307	1,070	5,320	7,230	810	377	250	650	523	375
18	735	520	1,250	1,210	5,660	10,140	830	440	250	645	532	354
19	710	555	1,410	610	6,290	10,740	870	474	250	653	668	354
20	313	475	1,620	791	6,230	9,100	890	613	250	644	804	354
21	396	500	1,360	731	5,770	8,690	1,070	542	250	660	885	302
22	569	500	1,080	978	4,800	6,830	1,070	457	250	668	793	323
23	720	430	1,490	1,180	4,840	7,160	1,090	506	250	530	661	294
24	720	619	1,440	1,450	4,410	6,780	1,110	441	250	618	566	267
25	354	502	1,700	1,690	3,700	6,340	1,140	484	250	562	615	285
26	354	540	1,520	1,820	3,720	5,430	750	524	250	558	626	276
27	438	385	1,460	1,960	4,250	4,320	810	429	250	695	408	276
28	416	234	1,240	1,970	3,770	3,610	840	447	250	661	318	212
29	460	......	785	2,200	3,810	4,030	839	451	271	661	315	268
30	530	......	731	2,740	4,140	2,750	478	401	576	661	258	243
31	613	......	1,220	......	5,560	......	527	430	......	661	......	243

Monthly inflow to Pathfinder reservoir at Pathfinder, Wyo., for 1911.

[Drainage area, 12,000 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	735	313	434	0.036	0.04	26,700
February	1,080	234	627	.052	.05	34,800
March	3,200	307	1,370	.114	.13	84,300
April	3,300	610	1,570	.131	.15	93,500
May	6,290	2,210	4,320	.360	.42	266,000
June	10,700	2,750	6,840	.570	.64	407,000
July	2,400	478	1,350	.112	.13	82,900
August	646	342	475	.040	.05	29,200
September	688	226	332	.028	.03	19,800
October	1,870	530	850	.071	.08	52,200
November	885	128	507	.042	.05	30,200
December	502	212	336	.028	.03	20,700
The year	10,700	128	1,580	.132	1.79	1,150,000

NORTH PLATTE RIVER AND INTERSTATE CANAL AT WHALEN, WYO.

Location.—At the head of the Interstate canal at Whalen, in sec. 11, T. 26 N., R. 65 W. The nearest important tributary is Cottonwood Canyon Creek, an intermittent stream which enters 1½ miles below.

Records available.—May 1, 1909, to December 31, 1911. These records represent the discharge passing the overfall weir at Whalen and also the amount of water passing the head gates of the canal, which are located just above the Whalen weir. From June 14, 1900, to November 17, 1908, a station was maintained at Guernsey. The flow between the two points is very nearly comparable, as only a few intermittent tributaries enter between the two points.

Drainage area.—Not measured.

Gage.—To determine the flow over the weir a vertical staff is used, its zero being at the weir crest. The discharge is then computed by a weir formula. There are also four sluice gates in the dam, through which the discharge is computed. There is also a second gage in the river 75 feet downstream from the crest gage, having its zero 10.00 feet below that of the weir gage. This latter gage is only used in computing the discharge through the gates when the openings are submerged. The discharge through the head gates of the canal is computed from the nine gate openings. There is a vertical staff located in the canal 1,000 feet below the head gates, which is used in computing the discharge when the head-gate openings are submerged.

Discharge measurements.—In order to check the coefficients used in the discharge computations, a car and cable have been erected 1 mile downstream. Sufficient measurements have not yet been made to complete the checking.

Artificial control.—The discharge represents largely the effect of the Pathfinder reservoir which stores water for use in the Interstate canal.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from North Platte River of 319 second-feet between Pathfinder reservoir and the Wyoming-Nebraska line, exclusive of the diversion by the United States Reclamation Service. It is not known what percentage of these diversions is above the stations.

Cooperation.—Station maintained by the United States Reclamation Service, by which the records are furnished.

Discharge measurements of North Platte River and Interstate canal at Whalen, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 8	Paul Rothi	2.09	721	Apr. 28	Paul Rothi	2.71	1,390
11	.....do	2.02	686	May 4	.....do	3.63	2,550
18	.....do	2.19	828	30	.....do	1.82	533
22	.....do	2.60	1,330	June 17	.....do	4.71	4,700
25	.....do	2.60	1,212	Sept. 19	.....do	2.55	1,180

Daily discharge, in second-feet, of North Platte River and Interstate canal at Whalen, Wyo., for 1911.

[United States Reclamation Service engineers, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	259	1,871	667	808	2,722	2,456	1,774	2,848	2,177	2,000	835	239
2	170	1,919	615	771	2,838	2,650	3,682	2,848	2,119	1,269	646	249
3	160	1,273	601	802	2,838	2,322	3,523	2,868	2,115	1,012	646	593
4	175	1,206	642	893	2,838	2,598	3,626	2,883	2,115	879	730	539
5	578	1,022	607	1,287	2,872	2,309	3,474	2,883	2,058	954	835	648
6	521	1,140	622	1,626	2,142	2,182	3,474	2,883	2,058	1,163	950	606
7	521	916	697	1,494	1,637	2,309	3,474	3,245	2,006	1,290	835	556
8	521	1,079	774	1,313	1,636	2,329	3,425	3,179	1,978	1,247	835	556
9	521	911	1,311	2,025	1,427	2,282	3,425	2,883	2,005	1,218	835	556
10	521	713	1,224	1,697	1,499	2,417	3,425	2,798	2,008	1,218	835	556
11	521	741	1,409	1,580	1,486	2,347	3,327	2,798	1,963	1,147	362	498
12	575	821	1,407	1,568	1,601	2,486	3,248	2,798	1,981	1,533	280	498
13	519	783	1,467	1,598	1,601	2,718	3,275	2,797	1,976	1,216	308	498
14	759	961	1,512	1,598	1,484	2,729	3,202	2,756	2,070	781	340	498
15	820	1,040	1,552	1,607	1,323	2,943	3,212	2,791	2,280	833	386	498
16	a1,296	918	1,599	1,584	1,265	4,384	3,244	2,791	2,295	1,079	448	498
17	a1,260	945	1,763	1,559	1,803	5,872	3,585	2,709	2,294	1,079	448	498
18	810	901	3,479	1,821	2,011	5,766	3,585	2,709	2,218	1,014	481	498
19	765	682	3,469	1,849	2,011	4,796	3,585	2,709	2,218	950	656	498
20	675	339	2,416	1,696	1,953	4,181	3,513	2,745	2,294	950	765	498
21	525	259	1,714	1,682	1,961	4,073	3,567	2,745	2,294	950	823	441
22	525	234	1,289	2,127	1,965	3,965	3,426	2,745	2,294	950	1,093	441
23	470	157	952	2,100	1,936	3,425	3,308	2,745	2,294	950	1,093	441
24	470	375	952	2,100	1,942	3,658	3,012	2,665	2,295	950	890	441
25	470	519	785	2,100	1,821	3,788	2,955	2,665	2,373	950	828	441
26	540	691	918	2,102	1,741	3,651	2,985	2,665	2,707	950	711	441
27	675	519	1,015	2,132	1,630	3,758	2,965	2,620	2,707	950	642	441
28	675	564	894	2,332	1,626	3,758	2,930	2,595	2,838	950	324	b 400
29	675	....	803	2,375	1,638	2,734	2,838	2,517	2,924	892	317	b 350
30	997	....	826	2,739	1,675	1,634	2,843	2,306	2,606	835	220	b 350
31	1,150	....	836	....	2,344	....	2,848	2,177	....	835	....	b 330

a Discharge too high on account of backwater.
b Partly estimated.

NOTE.—Daily discharge has been computed by engineers of the United States Reclamation Service and is published without change or verification.

Monthly discharge of North Platte River and Interstate canal at Whalen, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	1,300	160	617	37,900
February	1,920	157	839	46,600
March	3,480	601	1,250	76,900
April	2,740	771	1,700	101,000
May	2,870	1,260	1,910	117,000
June	5,870	1,630	3,220	192,000
July	3,680	1,770	3,250	200,000
August	3,240	2,180	2,750	169,000
September	2,920	1,960	2,250	134,000
October	2,000	781	1,060	65,200
November	1,090	230	647	38,500
December	648	239	471	29,000
The year	5,870	157	1,670	1,210,000

NOTE.—Monthly discharge computed by engineers of the United States Geological Survey from data furnished by the United States Reclamation Service and published herewith.

Daily discharge, in second-feet, of Interstate canal at Whalen, Wyo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	448	740	1,165	175	1,250	1,225	204
2	....	461	469	1,200	674	1,250	1,225	51
3	....	478	469	1,225	950	1,270	1,225	0
4	....	482	469	1,225	1,160	1,285	1,225	195
5	....	535	400	1,230	1,210	1,285	1,225	270
6	....	601	73	1,230	1,210	1,285	1,225	275
7	....	667	101	1,230	1,210	770	1,225	280
8	....	680	341	1,250	1,260	910	1,145	170
9	....	822	350	1,270	1,260	1,180	1,115	....
10	....	862	549	1,270	1,260	1,200	1,115	....
11	....	956	592	1,270	1,200	1,200	1,010	....
12	....	944	645	1,270	1,275	1,200	900	....
13	....	974	703	1,270	1,300	1,200	895	....
14	....	974	698	1,200	1,320	1,225	920	....
15	....	1,009	712	1,240	1,330	1,260	985	....
16	....	1,040	715	1,260	560	1,260	1,000	....
17	....	1,053	723	1,285	0	1,260	1,000	....
18	....	1,090	713	1,285	0	1,260	1,000	....
19	....	1,120	713	1,285	0	1,260	1,000	....
20	....	1,055	732	1,285	0	1,295	1,000	....
21	....	1,040	811	1,285	52	1,295	1,000	....
22	....	1,050	815	1,285	416	1,295	1,000	....
23	....	1,090	920	1,260	624	1,295	1,000	....
24	....	1,090	990	1,190	943	1,295	1,000	....
25	....	1,090	1,035	1,110	1,070	1,295	1,000	....
26	....	1,090	1,050	1,080	1,100	1,295	1,000	....
27	....	1,120	1,080	1,080	1,170	1,250	1,000	....
28	20	1,185	1,130	1,080	1,225	1,225	950	....
29	178	1,160	1,130	850	1,240	1,225	751	....
30	346	850	1,130	250	1,245	1,225	238	....
31	414	....	1,130	....	1,250	1,225	....	....

NOTE.—Determination of daily discharge published as furnished by the United States Reclamation Service without change or verification.

Monthly discharge of Interstate canal at Whalen, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	0	0	0	0
February	0	0	0	0
March	414	0	30.9	1,900
April	1,180	448	900	53,600
May	1,130	73	714	43,900
June	1,280	250	1,180	70,200
July	1,330	0	895	55,000
August	1,300	770	1,230	75,600
September	1,220	238	1,020	60,700
October	280	0	46.6	2,870
November	....	....	0	0
December	....	....	0	0
The year	1,330	0	502	364,000

NOTE.—Monthly discharge computed by engineers of the United States Geological Survey from data furnished by the United States Reclamation Service and published herewith.

NORTH PLATTE RIVER NEAR MITCHELL, NEBR.

Location.—At highway bridge 1 mile south of Mitchell, on line between secs. 27 and 28, T. 23 N., R. 56 W. The nearest tributary is Spottedtail Creek, an intermittent stream entering just below the station. The only important tributary between the station and the Wyoming line is Horse Creek.

Records available.—June 3, 1901, to December 23, 1911. From May 29, 1897, to October 31, 1900, a station was maintained near Gehring. Although no tributaries enter between the two points, the records are not directly comparable during the irrigation season, as water is diverted for irrigation.

Drainage area.—24,400 square miles.

Gage.—Chain gage; datum lowered 1.00 foot on May 3, 1902, to avoid negative readings.

Channel.—Very slightly shifting.

Discharge measurements.—Made from bridge.

Winter flow.—The river is frozen over during the winter months and records are discontinued.

Artificial control.—The Pathfinder reservoir of the United States Reclamation Service controls the flow at this station to a certain extent.

Diversions.—Prior to September 1, 1912, there were approved diversions of 2,188 second-feet from the North Platte between the Wyoming-Nebraska line and Mitchell, and 75 second-feet from intervening tributaries.

Accuracy.—Conditions are favorable for accurate results and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data are furnished.

Discharge measurements of North Platte River near Mitchell, Nebr., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 8	R. H. Willis	1.90	80.4
13	.....do	2.60	1,000
Aug. 4	.....do	2.35	710
Sept. 17	R. H. Fletcher	2.38	710

Daily gage height, in feet, of North Platte River near Mitchell, Nebr., for 1911.

[B. H. Newbold, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	1.8	2.2	2.4	2.2	....	2.5	2.6
2	2.7	2.1	....	2.4	2.1	2.7	2.5	2.6
3	2.9	2.0	2.7	2.4	....	2.5	2.4	....
4	2.9	....	2.7	2.4	2.1	2.6	2.4	2.8
5	2.9	2.3	2.7	2.4	2.1	2.5	....	2.7
6	3.1	2.1	2.5	....	2.1	2.5	2.5	2.7
7	....	2.0	2.4	2.4	2.1	2.4	2.5	2.7
8	2.9	2.0	2.5	2.4	2.2	....	2.5	2.7
9	2.6	2.0	....	2.9	2.2	2.5	2.5	2.7
10	2.5	2.0	2.5	2.6	....	2.6	2.5	....
11	2.4	....	2.5	2.6	2.2	2.6	2.5	2.6
12	2.4	2.6	2.4	2.5	2.2	2.6	....	2.6
13	2.4	2.6	2.4	....	2.2	2.6	2.5	2.6
14	....	2.6	2.4	2.5	2.3	2.7	2.6	2.5
15	2.3	2.5	2.3	2.5	2.2	....	2.7	2.5
16	2.3	2.6	....	2.4	2.2	2.6	2.6	2.6
17	2.2	2.8	2.9	2.4	2.4	2.5	2.6	....
18	2.2	....	3.0	2.4	2.3	2.5	2.5	2.6
19	2.2	3.6	3.0	2.4	2.3	2.5	....	2.5
20	2.2	3.3	3.0	....	2.3	2.5	2.4	2.5
21	....	3.1	3.0	2.4	2.3	2.5	2.4	2.5
22	2.3	3.1	3.0	2.4	2.3	....	2.5	2.5
23	2.3	3.1	....	2.4	2.4	2.5	2.7	2.5
24	2.2	3.0	3.0	2.4	....	2.5	2.6	....
25	2.2	....	2.7	2.3	2.4	2.5	2.5	....
26	2.2	3.1	2.6	2.2	2.4	2.5	....	....
27	2.2	3.1	2.5	....	2.5	2.5	2.5	....
28	....	3.2	2.5	2.2	2.6	....	2.6	....
29	2.1	2.9	2.4	2.2	2.65	....	2.6	....
30	2.0	2.8	....	2.2	2.7	2.5	2.7	....
31	1.9	....	2.4	2.2	....	2.5	....	....

Daily discharge, in second-feet, of North Platte River near Mitchell, Nebr., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	990	50	360	730	440	1,380	920	1,140
2	1,230	210	840	730	340	1,380	920	1,140
3	1,830	130	1,320	730	340	920	730	1,380
4	1,830	290	1,320	730	340	1,140	730	1,640
5	1,830	450	1,320	730	340	920	825	1,380
6	2,560	210	850	730	340	920	920	1,380
7	2,200	130	750	730	340	730	920	1,380
8	1,830	130	930	730	440	825	920	1,380
9	990	130	930	1,920	440	920	920	1,380
10	780	130	930	1,140	440	1,140	920	1,260
11	600	560	930	1,140	440	1,140	920	1,140
12	600	990	730	920	440	1,140	920	1,140
13	600	990	730	920	440	1,140	920	1,140
14	525	990	730	920	570	1,380	1,140	920
15	450	780	530	920	440	1,260	1,380	920
16	450	990	1,220	730	440	1,140	1,140	1,140
17	320	1,510	1,900	730	730	920	1,140	1,140
18	320	3,060	2,200	730	570	920	920	1,140
19	320	4,600	2,200	730	570	920	825	920
20	320	3,300	2,200	730	570	920	730	920
21	385	2,570	2,200	730	570	920	730	920
22	450	2,570	2,200	730	570	920	920	920
23	450	2,570	2,200	730	730	920	1,380	920
24	320	2,200	2,200	730	730	920	1,140	....
25	320	2,380	1,410	570	730	920	920	....
26	320	2,570	1,150	440	730	920	920	....
27	320	2,570	930	440	920	920	920	....
28	265	2,900	930	440	1,140	920	1,140	....
29	210	1,900	730	440	1,260	920	1,140	....
30	130	1,580	730	440	1,380	920	1,380	....
31	80	....	730	440	....	920	....	....

NOTE.—Daily discharge determined as follows: May 1 to June 13, from a fairly well defined rating curve; June 14 to Aug. 4, by indirect method for shifting channels; Aug. 5 to Dec. 23, from well-defined curve (1910); discharge interpolated for days for which gage heights are missing.

Monthly discharge of North Platte River near Mitchell, Nebr., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	2,560	80	769	47,300	B.
June	4,600	50	1,450	86,300	B.
July	2,200	360	1,230	75,600	A.
August	1,920	440	758	46,600	A.
September	1,380	340	592	35,200	A.
October	1,380	730	1,010	62,100	A.
November	1,380	730	978	58,200	A.
December	1,640	....	1,090	67,000	B.
The period	....	....	....	478,000	

NORTH PLATTE RIVER AT NORTH PLATTE, NEBR.

Location.—At highway bridge half a mile north of North Platte, in sec. 28, T. 14 N., R. 30 W., 1 mile below mouth of Scout Creek and 4½ miles above the junction with the South Platte.

Records available.—February 25, 1895, to December 23, 1911.

Drainage area.—28,500 square miles.

Gage.—A staff gage installed October 15, 1910. From October 5, 1894, to May 31, 1910, the gage was a vertical staff at the railroad bridge 2 miles east of North Platte. On March 25, 1910, the station was moved 2 miles upstream to its present site and a chain gage reading to a different datum was installed. This gage was stolen July 1, 1910, and the records interrupted until October 15, 1910, when the present gage reading to a different datum was placed in position.

Channel.—Very shifting.

Discharge measurements.—Made from highway bridge.

Winter flow.—The river frequently freezes to the bottom during the winter, as it is very shallow.

Diversions.—Prior to September 1, 1912, there were approved diversions of 3,626 second-feet from the North Platte between Mitchell and North Platte, and 927 second-feet from intervening tributaries.

Accuracy.—Owing to the very shifting channel the estimates have been obtained by the indirect method and can be considered only fair.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data were furnished.

Discharge measurements of North Platte River at North Platte, Nebr., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 24	A. A. Dobson	3.85	3,400	Aug. 24	A. B. Price	2.80	610
Apr. 22	A. B. Price	2.00	89.2	Sept. 24	.....do	2.50	222
May 20	.....do	2.90	547	Oct. 6	R. H. Fletcher	4.00	3,500
25	.....do	2.40	416	28	A. B. Price	3.40	1,420
June 21	.....do	3.00	891	Nov. 26	.....do	3.10	1,200
Aug. 11	.....do	3.20	969				

Daily gage height, in feet, of North Platte River at North Platte, Nebr., for 1911.

[Zack Carter, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	3.1	2.9	2.8	2.5	2.7	2.7	2.5	....	3.15	3.45
2	....	3.2	....	2.9	2.5	....	2.7	2.5	2.9	3.15	3.55
3	....	3.35	2.9	3.1	2.45	2.85	2.65	....	3.05	3.65	....
4	....	3.2	2.8	3.3	....	2.85	2.55	2.65	3.25	4.0	3.6
5	....	....	2.8	3.4	2.3	2.8	2.5	2.6	3.55	....	3.6
6	4.45	3.4	2.7	3.5	2.1	2.7	....	2.6	3.85	3.55	3.65
7	4.4	3.4	2.7	....	1.95	2.6	3.65	2.5	3.65	3.4	3.7
8	4.35	3.5	2.6	3.8	1.95	2.25	3.55	2.5	....	3.55	3.6
9	4.3	3.3	....	3.65	2.0	....	3.5	2.5	3.5	3.6	3.65
10	4.2	3.2	2.6	3.5	1.95	2.7	3.35	....	3.35	3.55	....
11	4.0	3.2	2.4	3.7	....	2.6	3.05	2.5	3.3	3.45	3.65
12	....	....	2.25	3.7	2.05	2.5	3.0	2.5	3.35	....	3.6
13	3.9	3.2	2.1	3.3	1.75	2.7	....	2.5	3.3	3.3	3.55
14	3.8	3.2	2.0	....	1.7	2.7	3.25	2.5	3.35	3.2	3.45
15	3.8	3.3	1.95	3.05	1.7	2.7	3.45	2.65	....	3.35	3.45
16	3.8	3.3	....	3.0	1.7	....	3.3	2.6	3.6	3.45	3.4
17	3.7	3.1	2.0	3.1	2.55	2.6	3.1	....	3.55	3.55	....
18	3.7	2.95	2.25	2.8	....	2.6	3.1	2.6	3.6	3.6	3.4
19	....	....	2.4	2.55	2.05	2.5	3.05	2.55	3.55	....	3.4
20	3.6	3.0	2.3	2.4	2.0	2.5	....	2.5	3.45	3.6	3.45
21	3.55	3.1	2.2	....	2.95	2.4	3.15	2.4	3.4	3.6	3.5
22	3.4	3.2	2.0	2.4	2.7	2.55	2.95	2.45	....	3.5	3.6
23	3.5	3.4	....	2.4	3.6	....	2.9	2.5	3.5	3.35	3.7
24	3.45	3.75	2.0	2.5	3.6	3.5	2.8	2.5	3.45	3.2	....
25	3.5	3.85	2.0	2.5	....	3.45	2.75	2.6	3.45	3.0	....
26	....	....	2.0	2.3	3.55	3.3	2.7	2.6	3.45	3.1	....
27	3.3	3.75	2.0	2.45	3.4	3.35	....	2.7	3.4	3.0	....
28	3.4	3.5	2.2	....	3.3	3.2	2.7	2.75	3.4	3.1	....
29	....	3.35	2.3	2.8	3.05	3.15	2.6	2.8	....	3.25	....
30	....	3.1	....	2.65	2.75	....	2.6	2.8	3.3	3.35	....
31	....	2.95	....	2.6	....	2.85	2.6	....	3.25	....	....

NOTE.—River free from ice Feb. 13; frozen over Dec. 24 to 31.

Daily discharge, in second-feet, of North Platte River at North Platte, Nebr., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	1,200	850	600	480	480	400	320	562	900	2,050
2	....	1,400	850	650	480	565	400	320	625	900	2,350
3	....	1,780	850	925	440	650	370	360	925	1,950	2,420
4	....	1,400	750	1,300	370	650	300	400	1,300	3,080	2,500
5	....	1,650	750	1,750	300	590	270	350	1,850	2,390	2,500
6	....	1,900	650	2,000	200	480	1,110	350	3,000	1,700	2,680
7	....	1,900	650	2,320	150	370	1,950	300	2,300	1,550	2,850
8	....	2,200	550	2,650	150	160	1,700	300	2,080	1,900	2,500
9	....	1,650	525	2,150	175	305	1,570	300	1,850	2,050	2,680
10	....	1,400	500	1,750	150	450	1,240	300	1,500	1,900	2,680
11	....	1,400	375	2,150	175	370	740	300	1,400	1,650	2,680
12	....	1,400	275	2,150	200	300	670	300	1,500	1,480	2,500
13	3,550	1,400	225	1,200	110	450	860	300	1,400	1,300	2,350
14	3,200	1,400	175	988	100	450	1,050	250	1,400	1,100	2,050
15	3,200	1,650	165	775	100	450	1,600	350	1,720	1,300	2,050
16	3,200	1,650	170	700	100	410	1,250	325	2,030	1,650	1,900
17	2,850	1,200	175	850	495	370	900	325	1,900	2,100	1,900
18	2,850	975	275	475	338	370	900	325	2,030	2,250	1,900
19	2,680	988	375	275	180	300	825	300	1,900	2,250	1,900
20	2,500	1,050	300	200	160	300	938	250	1,620	2,250	2,050
21	2,350	1,200	250	185	825	225	1,050	200	1,400	2,250	2,200
22	1,900	1,400	175	170	360	300	750	230	1,520	2,000	2,500
23	2,200	1,900	132	225	2,150	975	675	250	1,650	1,600	2,850
24	2,050	3,020	90	300	2,150	1,650	550	250	1,530	1,250	....
25	2,200	3,250	90	375	2,080	1,530	540	280	1,530	900	....
26	1,920	3,080	90	350	2,000	1,200	480	280	1,530	1,050	....
27	1,650	2,900	90	450	1,600	1,300	480	360	1,430	1,050	....
28	1,900	2,050	160	610	1,380	1,130	480	400	1,430	1,200	....
29	....	1,650	200	770	925	950	400	500	1,290	1,520	....
30	....	1,050	400	600	540	750	400	500	1,150	1,780	....
31	....	900	....	560	....	550	400	....	1,050	....	....

NOTE.—Daily discharge determined from a series of parallel rating curves and by the indirect method for shifting channels. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of North Platte River at North Platte, Nebr., for 1911.

[Drainage area, 28,500 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
February 13-28	3,550	1,650	2,510	0.088	0.05	79,600
March	3,250	900	1,680	.059	.07	103,000
April	850	90	370	.013	.01	22,000
May	2,650	170	982	.034	.04	60,400
June	2,150	100	629	.022	.02	37,400
July	1,650	160	614	.022	.03	37,800
August	1,950	400	814	.029	.03	50,100
September	500	200	319	.011	.01	19,000
October	3,000	562	1,560	.055	.06	95,900
November	3,080	900	1,680	.059	.07	100,000
December	2,850	1,900	2,390	.084	.10	147,000
The period						752,000

Discharge estimated at 2,500 second-feet Dec. 24 to 31.

PLATTE RIVER NEAR COLUMBUS, NEBR.

Location.—At Meridian bridge 3 miles south of Columbus on line between sec. 36, T. 17 N., R. 1 W., and sec. 31, T. 17 N., R. 1 E., about 10 miles below the mouth of Prairie Creek and 5 miles above the mouth of Loup River.

Records available.—June 4, 1895, to December 31, 1911.

Drainage area.—56,900 square miles.

Gage.—A chain gage installed July 25, 1910. The bridge and the original gage previously used were washed out early in 1910. The new gage is at the same point as the old, but its datum is possibly slightly different. The datum of the original gage was unchanged up to the time of its destruction.

Channel.—Extremely shifting; at this point the river flows in the channels known as the main, middle, and south channels. The gage is located in the main channel.

Discharge measurements.—Made from bridges spanning each channel.

Winter flow.—The river freezes over during the winter and records are discontinued.

Diversions.—Prior to September 1, 1912, there were approved diversions of 4,888 second-feet for irrigation and 1,500 second-feet for power from Platte River between the junction of the two branches and Columbus, and this diversion, together with the evaporation from the wide shallow channels, frequently causes the flow to cease at this point during the late summer and fall.

Accuracy.—The extremely shifting channel makes it impossible to make estimates of daily discharge without almost weekly discharge measurements, as the gage heights are little if any index of the flow.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data were furnished.

Discharge measurements of Platt River near Columbus, Nebr., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 23	A. A. Dobson	1.45	803	Aug. 25	A. B. Price	0.90	761
Apr. 25	A. B. Price	0	73.1	Sept. 11	.....do	.10	93
May 18	.....do	1.15	1090	Sept. 24	.....do	−.30	29.7
May 26	.....do	.80	387	Oct. 4	.....do	1.80	36.9
				Nov. 10	.....do	3.15	1,400

Daily gage height, in feet, of Platte River near Columbus, Nebr., for 1911.

[W. D. Benson, observer.]

Day.	Mar.	Apr.	May.	Aug.	Sept.	Oct.	Nov.	Dec.
1		1.8	0.5			+0.3		3.05
2		1.8	.3			+ .15	2.55	
3		1.85	.2					
4		1.7	.5			1.8	2.8	3.35
5		1.6	.65			2.15	2.75	3.1
6		1.65	.7			3.0	2.95	
7		1.65	.7			2.85	3.0	
8		1.65	.7			2.7	3.3	
9		1.6	.8			3.4	2.65	
10			.9			3.5	2.45	3.3
11		1.55	.7		+0.1	3.65		3.1
12	2.1		.5		+ .35	3.5		3.15
13		1.2			− .05	3.45		3.05
14	1.8	([a])	1.65		− .25	3.35		3.0
15	1.55		1.3		+ .95	3.2		2.95
16	1.5				+ .8	3.1		3.1
17	1.35		1.3		+ .7	3.0		3.0
18	1.3		1.15		+ .45	2.9		
19	1.3				.35	3.05		2.85
20	1.3				.25	3.0	3.15	
21	1.2		1.0		.15	3.15	3.3	2.9
22	1.2		.9		− .05	3.05	3.2	2.75
23	1.45		.8			2.8		2.65
24	1.65		.75		− .3	3.0		
25	1.65	.0	.65	.9		3.0	3.35	2.95
26	1.4	.2	.8			2.95		
27	1.5	.2	.75			3.05		
28	1.65		.5			3.2		
29	1.8	.75	.45			3.1		
30	2.05	.4	.2	.05		3.2		
31	1.85			1.15		3.15		

[a] Sand bar under gage.

NOTE.—Channel dry Apr. 17 to 25, May 31 to Aug. 24, and Sept. 25 to 30. Ice caused backwater at gage from Nov. 11 to Dec. 31.

PLATTE RIVER NEAR LESHARA, NEBR.

Location.—At highway bridge 2 miles southeast of Leshara, about sec. 34, T. 16 N., R. 9 E.; 7 miles above the entrance of Otoe Creek.

Records available.—May 19 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain; datum unchanged.

Channel.—Extremely shifting.

Discharge measurements.—Made from the highway bridge.

Winter flow.—Data too meager to determine.

Diversions.—Prior to September 1, 1912, there were approved diversions of 2,500 second-feet for power and irrigation and 4,000 second-feet for power from Platte River between the mouth of Loup River and this station. Below there were approved diversions of 2,500 second-feet for power.

Accuracy.—Daily records can be considered only approximately accurate.

Cooperation.—Station maintained by the State engineer, by whom the field data are furnished.

Discharge measurements of Platte River near Leshara, Nebr., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 19	A. B. Price	2.85	4,070	Aug. 10	A. B. Price	2.60	2,250
30	do	2.70	2,880	27	do	2.80	2,730
June 12	do	2.20	1,510	Sept. 11	do	4.00	7,710
23	do	2.30	1,170	Oct. 3	do	2.90	2,950
July 8	do	2.05	1,110	Nov. 9	do	3.00	4,220
31	do	2.20	1,320				

Daily gage height, in feet, of Platte River near Leshara, Nebr., for 1911.

[H. M. Eggers, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.50	2.28	2.25	2.48	2.80	3.30	3.15
2		2.52	2.28	2.25	2.39	2.90	3.00	3.05
3		2.55	2.05	2.40	2.38	2.90	2.95	3.00
4		2.50	1.80	2.88	2.40	2.80	2.60	3.20
5		2.44	2.06	2.62	2.40	2.85	2.85	3.60
6		2.30	1.95	2.47	2.38	3.08	2.20	3.40
7		2.25	2.05	2.50	2.39	5.20	2.60	3.30
8		2.40	2.00	2.66	2.50	4.26	3.00	3.35
9		2.52	2.35	2.75	2.55	3.55	3.05	3.42
10		2.40	2.26	2.60	2.61	3.42	3.20	3.35
11		2.35	2.38	2.58	2.60	3.30	3.15	3.55
12		2.22	2.36	2.70	3.60	3.23	3.10	3.40
13		2.3	2.56	2.75	2.83	3.20	3.30	3.30
14		2.40	2.46	2.60	3.23	3.35	3.10	3.25
15		2.30	3.15	2.58	2.60	3.21	3.00	3.20
16		2.39	2.72	2.53	2.57	3.05	2.80	3.15
17		2.30	2.73	2.50	2.80	3.00	2.65	3.05
18		2.29	2.90	2.68	2.70	3.10	2.45	3.00
19	2.85	2.30	2.30	2.85	2.62	3.15	3.40	2.80
20		2.35	2.20	2.90	2.58	2.95	4.00	2.85
21		2.54	2.20	2.85	2.57	3.12	3.70	2.95
22		2.32	2.40	2.80	2.70	3.10	3.00	3.10
23		2.30	2.30	2.60	2.60	3.07	2.90	3.00
24	3.25	2.28	2.40	3.25	2.50	3.00	2.60	2.90
25	3.05	2.25	3.50	3.15	2.58	3.05	2.64	2.85
26	2.70	2.13	3.30	2.20	2.50	3.00	2.80	2.95
27	2.60	2.13	3.89	2.70	2.55	3.05	3.00	2.80
28	2.72	2.20	2.87	2.68	2.53	2.95	3.10	2.70
29	2.60	2.60	2.51	2.57	2.45	3.15	3.30	3.10
30	2.65	2.43	2.50	2.55	2.85	3.10	3.29	3.00
31	2.62		2.33	2.52		3.16		3.05

Daily discharge, in second-feet, of Platte River near Leshara, Nebr., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2,200	1,350	1,400	1,870	2,700	5,300	4,800
2		2,250	1,350	1,400	1,670	3,020	4,050	4,400
3		2,320	1,050	1,690	1,650	3,020	3,850	4,200
4		2,200	820	2,960	1,690	2,700	2,700	5,000
5		2,050	1,050	2,200	1,690	2,860	3,500	6,850
6		1,750	1,000	1,840	1,650	3,630	1,740	5,900
7		1,650	1,120	1,910	1,670	14,300	2,860	5,450
8		1,950	1,060	2,310	1,910	9,100	4,220	5,680
9		2,250	1,590	2,560	2,030	5,520	4,420	5,990
10		1,950	1,420	2,150	2,180	5,300	4,610	5,680
11		1,600	1,650	2,100	2,150	4,750	4,800	6,600
12		1,400	1,610	2,410	5,750	4,450	4,600	5,900
13		1,550	2,050	2,560	2,800	4,350	5,450	5,450
14		1,750	1,820	2,150	4,220	5,000	4,600	5,220
15		1,300	3,900	2,100	2,150	4,430	4,200	5,000
16		1,610	2,470	1,980	2,080	3,780	3,500	4,800
17		1,300	2,500	1,910	2,700	3,600	3,000	4,400
18		1,280	3,020	2,360	2,410	3,950	2,420	4,200
19	4,070	1,300	1,490	2,860	2,200	4,400	5,900	3,500
20	4,350	1,380	1,310	3,020	2,100	3,650	8,850	3,680
21	4,620	1,700	1,310	2,860	2,080	4,300	7,350	4,020
22	4,900	1,170	1,690	2,700	2,410	4,200	4,200	4,600
23	5,170	1,150	1,490	2,150	2,150	4,050	3,850	4,200
24	5,450	1,140	1,690	4,300	1,910	3,850	2,850	3,850
25	4,300	1,080	5,300	3,900	2,100	4,000	2,970	3,680
26	3,050	1,050	4,500	1,310	1,910	3,850	3,500	4,020
27	2,750	1,050	7,150	2,410	2,030	4,000	4,200	3,500
28	2,810	1,140	2,920	2,360	1,980	3,850	4,600	3,150
29	2,450	1,750	1,930	2,080	1,800	4,650	5,450	4,600
30	2,600	1,430	1,910	2,030	2,860	4,400	5,400	4,200
31	2,510		1,550	1,960		4,700		4,400

Note.—Daily discharge determined from several poorly defined rating curves and by indirect method for shifting channels.

Monthly discharge of Platte River near Leshara, Nebr., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 19-31	5,450	2,450	3,770	100,000	C.
June	2,320	1,050	1,590	94,600	C.
July	7,150	820	2,100	129,000	C.
August	4,300	1,310	2,320	143,000	C.
September	5,750	1,650	2,260	134,000	C.
October	14,300	2,700	4,530	279,000	C.
November	8,850	1,740	4,300	256,000	C.
December	6,850	3,150	4,740	291,000	C.
The period				1,430,000	

BIG CREEK NEAR DOWNINGTON, WYO.

Location.—In the NE.¼ SW.¼ sec. 32, T. 13 N., R. 81 W., below all important tributaries. One small creek enters below the gaging station. This station is in the Hayden National Forest.

Records available.—Gage heights, May 7 to June 17, 1911.

Drainage area.—Not measured.

Gage.—Staff.

Accuracy.—As no discharge measurements have been made, no estimates of discharge can be made.

Cooperation.—This station is maintained in cooperation with the United States Forest Service.

Daily gage height, in feet, of Big Creek near Downington, Wyo., for 1911.

Day.	May.	June.	Day.	May.	June.	Day.	May.	June.
1		2.6	11	2.2	3.1	21	2.3	
2		3.0	12	2.2	3.2	22	2.3	
3		3.1	13	2.4	3.2	23	2.2	
4		3.1	14	2.4	3.1	24	2.4	
5		3.2	15	2.6	3.1	25	2.6	
6		3.3	16	2.6	4.1	26	2.4	
7	2.7	4.0	17	2.5	3.2	27	2.4	
8	2.4	3.5	18	2.4		28	2.5	
9	2.4	3.3	19	2.3		29	2.5	
10	2.2	3.2	20	2.4		30	2.6	
						31	2.8	

MULLEN CREEK NEAR FRENCH, WYO.

Location.—At old highway bridge in sec. 33, T. 15 N., R. 80 W., 10 miles east of French post office. There is no important tributary between the station and the junction with the South Fork, 6 miles below. This station is in the Cheyenne National Forest.

Records available.—Fragmentary records, June 21 to September 24, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine condition.

Discharge measurements.—Made by wading.

Winter flow.—No information.

Diversions.—No water is diverted above the station, and therefore the records represent the natural run-off.

Accuracy.—Owing to insufficient data no estimates of flow can be made.

Cooperation.—Station maintained in cooperation with the State engineer.

The following discharge measurement was made by R. H. Fletcher:

June 21, 1911: Gage height, 1.90 feet; discharge, 72 second-feet.

Daily gage height, in feet, of Mullen Creek near French, Wyo., for 1911.

[Martin Farrell, observer.]

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1					16		1.25		
2		1.4			17				.9
3				1.05	18				
4					19				
5					20			1.1	
6			1.1		21	1.9			
7					22				
8					23				
9		1.3			24		1.2		.9
10				1.0	25				
11					26			1.1	
12					27	1.6			
13			1.05		28				
14					29				
15					30		1.1		
					31				

FRENCH CREEK NEAR FRENCH, WYO.

Location.—In sec. 4, T. 14 N., R. 81 W., about 3½ miles southeast of French. The station is 2 miles above the mouth, and is below all tributaries. This station is in the Cheyenne National Forest.

Records available.—April 30 to July 15, 1911.

Drainage area.—Fifty-seven square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made by wading.

Diversions.—No water is diverted above the station, and therefore the records represent the natural flow. Prior to July 1, 1912, there were adjudicated diversions for 3 second-feet below the station. From North French Creek there is an adjudicated diversion of 4 second-feet.

Accuracy.—Conditions are favorable for good results, and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of French Creek near French, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Apr. 30	Fletcher and Kingdon	1.60	46.6
May 31	R. H. Fletcher	2.60	453
June 11	.....do	2.50	385
21	.....do	2.65	429
July 12	.....do	1.82	85.9

Daily gage height, in feet, and discharge, in second-feet, of French Creek near French, Wyo., for 1911.

[Mrs. J. W. Jenkins, observer.]

Day.	April.		May.		June.		July.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.55	44	2.90	610	2.20	225
2			1.52	40	2.90	610	2.15	202
3			1.50	38	2.85	580	2.10	180
4			1.55	44	2.85	580	2.10	180
5			1.72	69	2.80	550	2.05	160
6			1.92	114	2.90	610	2.00	140
7			2.00	140	3.05	702	2.00	140
8			2.20	225	3.35	898	2.00	140
9			2.35	300	2.95	640	1.95	124
10			2.25	250	2.90	610	1.90	107
11			2.12	189	3.00	670	1.85	95
12			2.00	140	2.85	580	1.80	83
13			2.20	225	2.85	580	1.80	83
14			2.28	265	2.85	580	1.80	83
15			2.45	352	3.00	670	1.80	83
16			2.50	380	3.25	832		
17			2.55	408	2.95	640		
18			2.55	408	2.85	580		
19			2.35	300	2.85	580		
20			2.18	216	2.95	640		
21			2.12	189	2.90	610		
22			2.20	225	2.80	550		
23			2.30	275	2.70	490		
24			2.35	300	2.60	435		
25			2.48	369	2.50	380		
26			2.45	352	2.40	325		
27			2.35	300	2.32	285		
28			2.45	352	2.30	275		
29			2.55	408	2.25	250		
30	1.62	53	2.70	490	2.20	225		
31			2.75	520				

NOTE.—Daily discharge determined from a rating curve that is fairly well defined at all gage heights.

Monthly discharge of French Creek near French, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	520	38	256	15,700	B.
June	898	225	552	32,800	B.
July 1-15	225	83	135	4,020	B.

BRUSH CREEK NEAR SARATOGA, WYO.

Location.—On the county bridge half a mile above the mouth, about sec. 8, T. 15 N., R. 82 W. It is 18 miles southeast of Saratoga. There is no tributary below the station, and none for several miles above.

Records available.—April 28 to October 15, 1911.

Drainage area.—Not measured.

Gage.—Chain gage type.

Channel.—Apparently permanent.

Discharge measurements.—Made from bridge.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Brush Creek amounting to 87 second-feet, and from its tributaries 27 second-feet. Nearly all the diversions are above the station.

Accuracy.—Conditions are favorable for accurate results, and the estimates of flow should be reliable.

Cooperation.—Station maintained in cooperation with State engineer.

Discharge measurements of Brush Creek near Saratoga, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 28	Fletcher and Kingdon	2.75	111	June 22	R. H. Fletcher	3.80	110
June 1	R. H. Fletcher	4.35	759	July 12	.....do	1.65	17.7
11	.....do	3.80	339	Oct. 7	G. H. Russell	2.23	42.3

Daily gage height, in feet, of Brush Creek near Saratoga, Wyo., for 1911.

[Garland Gross, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		2.6	4.3	2.05	1.2	1.35	2.35
2		2.6	4.45	2.1	1.25	1.3	2.45
3		2.7	4.1	2.05	1.25	1.35	2.65
4		3.0	4.1	2.1	1.25	1.25	2.55
5			3.7	1.95	1.15	1.23	2.5
6		3.15	4.1	2.05	1.15	1.2	2.55
7		3.7	4.1	2.0	1.25	1.25	2.4
8		3.85	4.2	1.85	1.25	1.2	2.25
9		3.85	4.4	1.65	1.35	1.35	2.5
10		3.5	3.7	1.65	1.45	1.3	2.4
11		3.45	4.1	1.7	1.45	1.35	2.15
12		3.55	4.2	1.65	1.45	1.35	1.95
13		3.4	4.1	1.7	1.45	1.3	1.8
14		3.65	4.2	1.7	1.4	1.2	1.85
15		3.9	4.8	1.75	1.3	1.25	1.65
16		3.95	4.6	1.6	1.25	1.25	
17		4.05	4.6	1.6	1.25	1.2	
18		4.0	4.6	1.65	1.25	1.2	
19		3.6	4.25	1.55	1.15	1.35	
20		3.4	4.35	1.55	1.25	1.3	
21		3.3	4.2	1.8	1.4	1.35	
22		3.35	4.2	1.8	1.5	1.35	
23		3.65	4.05	1.7	1.6	1.6	
24		3.45	3.95	1.65	1.65	1.6	
25		3.35	3.05	1.6	1.55	1.6	
26		3.15	2.55	1.5	1.45	1.6	
27		3.8	2.3	1.5	1.4	1.5	
28	2.78	3.6	2.05	1.45	1.3	1.25	
29	2.5	3.75	2.0	1.35	1.3	1.25	
30	2.0	4.1	2.0	1.25	1.4	1.55	
31		4.3		1.3	1.4		

Daily discharge, in second-feet, of Brush Creek near Saratoga, Wyo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		88	690	32	4	7	57
2		88	815	35	5	6	68
3		103	540	32	5	7	96
4		154	540	35	5	5	81
5		170	345	26	3	5	74
6		186	540	32	3	4	81
7		345	540	29	5	5	62
8		408	610	22	5	4	48
9		408	770	14	7	7	74
10		280	345	14	9	6	62
11		265	540	16	9	7	39
12		295	610	14	9	7	26
13		250	540	16	9	6	20
14		328	610	16	8	4	22
15		430	1,140	18	6	5	14
16		455	950	13	5	5	14
17		510	950	13	5	4	14
18		480	950	14	5	4	14
19		310	650	12	3	7	14
20		250	730	12	5	6	14
21		223	610	20	8	7	14
22		236	610	20	10	7	14
23		328	510	16	13	13	14
24		265	455	14	14	13	14
25		236	164	13	12	13	14
26		186	81	10	9	13	14
27		385	52	10	8	10	14
28	116	310	32	9	6	5	14
29	74	365	29	7	6	5	14
30	29	540	29	5	8	12	14
31		690		6	8		14

NOTE.—Daily discharge determined from a rating curve fairly well-defined between 10 and 860 second-feet. Discharge estimated Oct. 15 to 31.

Monthly discharge of Brush Creek near Saratoga, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 28–30			73	434	B.
May	690	88	309	19,000	B.
June	1,140	29	533	31,700	B.
July	35	5	17.6	1.080	B.
August	14	3	7.0	430	B.
September	13	4	7.0	417	B.
October	96	14	33.8	2,080	D.
November			[a] 15.0	892	
December			[a] 10.0	615	
The period				56,600	

[a] Discharges estimated.

ENCAMPMENT RIVER AT ENCAMPMENT, WYO.

Location.—At the lower end of the smelter grounds at Encampment, in sec. 6, T. 14 N., R. 83 W. The nearest tributary is the North Fork, which enters 1 mile above.

Records available.—May 2 to November 10, 1911.

Drainage area.—235 square miles (measured from topographic sheets and King's Atlas).

Gage.—Chain gage type.

Channel.—A short distance below the station is a low diversion dam which may cause backwater whenever additional brush or drift collects on its crest.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during the winter months, and the records are discontinued.

Diversions.—Three large irrigation ditches divert water at a point 1 mile above the station. The smelter company has a pipe line which diverts water above the station, but as the tailrace of the power plant which the pipe line supplies is located just above the station, the amount diverted passes the gage. Water is also diverted below the station. Prior to July 1, 1912, there were adjudicated diversions from Encampment River amounting to 61 second-feet and from tributaries entering above 31 second-feet.

Accuracy.—The lodging of débris on the point of control makes the conditions somewhat uncertain, and therefore the estimates of flow can not be considered better than fair or possibly good.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Encampment River at Encampment, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 2	Fletcher and Kingdon.	4.00	331	June 20	R. H. Fletcher	5.35	1,250
30	R. H. Fletcher	5.80	1,540	July 11	.....do	3.50	200
June 10	.....do	5.55	1,450	Oct. 7	G. H. Russell	3.90	177

Daily gage height, in feet, of Encampment River at Encampment, Wyo., for 1911.

[Paul N. Elderkin, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	6.4	4.20	2.80	3.10	4.15	3.4
2	4.00	6.3	4.1	2.8	3.3	3.65	3.8
3	3.85	6.2	4.1	2.8	3.2	3.85	3.15
4	3.95	6.2	4.1	2.7	3.3	3.6	3.2
5	4.5	6.2	4.0	2.7	3.25	4.5	3.35
6	5.0	6.0	3.8	2.7	3.3	4.0	3.2
7	5.1	6.0	3.7	2.8	3.15	3.9	3.35
8	5.6	6.6	3.6	2.7	3.1	3.8	3.5
9	5.5	5.6	3.5	2.8	3.1	3.8	3.35
10	5.4	5.5	3.5	2.9	3.15	3.75	3.35
11	5.2	5.7	3.5	3.1	3.15	3.7	....
12	5.3	5.3	3.5	3.1	3.15	3.65	....
13	5.6	5.2	3.05	3.1	3.1	3.65	....
14	5.8	5.4	3.6	3.1	3.15	3.6	....
15	5.9	6.3	3.75	3.1	3.15	3.6	....
16	5.8	6.2	3.5	3.1	3.15	3.5	....
17	5.6	6.4	3.4	3.1	3.0	3.6	....
18	5.5	5.4	3.4	3.0	2.95	3.6	....
19	5.4	5.2	3.55	3.0	3.0	3.6	....
20	5.2	5.4	3.4	3.0	3.1	3.4	....
21	5.0	5.4	3.5	3.1	3.05	3.5	....
22	5.0	5.2	3.4	3.1	3.1	3.5	....
23	5.1	5.2	3.4	3.1	3.3	3.5	....
24	5.2	5.0	3.4	3.1	3.2	3.45	....
25	5.4	4.8	3.4	3.1	3.2	3.45	....
26	6.0	4.6	3.2	3.1	3.1	3.4	....
27	6.0	4.6	3.1	3.1	3.1	3.4	....
28	5.9	4.45	3.0	3.0	3.2	3.4	....
29	5.8	4.35	2.8	3.0	3.1	3.4	....
30	5.8	4.25	2.8	3.0	4.1	3.3	....
31	6.2	....	2.85	3.1	....	3.35	....

Daily discharge, in second-feet, of Encampment River at Encampment, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	300	2,240	432	72	114	385	85
2	344	2,130	386	72	151	180	7
3	289	2,030	386	72	182	230	62
4	325	2,080	386	62	161	150	65
5	595	2,030	344	62	142	440	80
6	935	1,830	272	62	151	220	65
7	1,020	1,830	242	72	123	190	80
8	1,440	2,460	215	62	114	150	9
9	1,360	1,440	192	72	114	150	80
10	1,260	1,360	192	84	123	140	80
11	1,100	1,540	192	114	123	130	....
12	1,180	1,180	192	114	123	122	....
13	1,440	1,100	228	114	114	122	....
14	1,640	1,260	215	114	123	113	....
15	1,730	2,130	257	114	123	113	....
16	1,640	2,030	192	114	123	98	....
17	1,440	2,240	171	114	98	113	....
18	1,360	1,260	171	98	91	113	....
19	1,260	1,100	204	98	98	113	....
20	1,100	1,260	171	98	114	85	....
21	935	1,260	192	114	106	98	....
22	935	1,100	171	114	114	98	....
23	1,020	1,100	171	114	151	98	....
24	1,100	935	171	114	132	92	....
25	1,260	790	171	114	132	92	....
26	1,830	655	132	114	114	85	....
27	1,830	655	114	114	114	85	....
28	1,730	566	98	98	132	85	....
29	1,640	510	72	98	114	85	....
30	1,640	457	72	98	375	74	....
31	2,030	....	78	114	....	80	....

NOTE.—Daily discharge determined as follows: May 2 to Sept. 29, from curve fairly well defined; Oct. 8 to Nov. 10, from poorly defined curve; Sept. 30 to Oct. 7, by indirect method for shifting channels.

Monthly discharge of Encampment River at Encampment, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	2,030	289	1,220	75,000	C.
June	2,460	457	1,420	84,500	C.
July	432	72	209	12,900	C.
August	114	62	96.5	5,930	C.
September	375	91	131	7,800	C.
October	440	74	140	8,610	D.
November 1-10	98	62	76.9	1,530	D.
The period	....	....	....	196,000	

COW CREEK NEAR SARATOGA, WYO.

Location.—At highway bridge in sec. 36, T. 16 N., R. 84 W., and 9 miles south of Saratoga. There are no tributaries between the station and the mouth, 4 miles below. Calf Creek enters about 2 miles above.

Records available.—May 3, 1911, to October 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made from bridge during high water, and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Cow Creek of 84 second-feet and from its tributaries, 27 second-feet, nearly all above the station.

Accuracy.—Owing to the shifting channel the estimates have been obtained by the indirect method and can only be considered fair.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Cow Creek near Saratoga, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 3	Fletcher and Kingdon.	2.30	34.1	June 20	R. H. Fletcher..........	3.00	150
29	R. H. Fletcher.........	2.75	95.6	July 11	.....do..................	2.00	2.1
June 10	.....do..................	3.10	140	Oct. 6	G. H. Russell..........	2,34	24.4

Daily gage height, in feet, of Cow Creek near Saratoga, Wyo., for 1911.

[Margaret Sullivan, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1....	....	2.95	2.30	2.0	2.05	2.2	16....	3.00	3.45	2.05	2.0	2.0	2.2
2....	....	2.90	2.22	2.0	2.05	2.2	17....	2.95	3.35	2.05	2.0	2.0	2.2
3....	2.30	3.15	2.22	2.0	2.05	2.2	18....	2.95	3.25	2.0	2.0	2.0	2.2
4....	2.30	3.25	2.28	2.0	2.05	2.3	19....	2.98	3.00	2.0	2.0	2.0	2.2
5....	2.30	3.18	2.30	2.0	2.0	2.32	20....	2.92	3.00	2.05	2.0	2.0	2.2
6....	2.55	3.29	2.40	2.0	2.02	2.35	21....	2.90	2.95	2.0	2.0	2.0	2.2
7....	2.65	3.28	2.15	2.0	2.0	2.25	22....	2.75	2.92	2.0	2.05	2.0	2.2
8....	2.80	3.38	2.0	2.0	2.0	2.22	23....	2.65	2.80	2.0	2.0	2.0	2.2
9....	3.05	3.40	2.0	2.0	2.0	2.2	24....	2.75	2.75	2.0	2.0	2.0	2.2
10....	3.05	3.10	2.0	2.05	2.0	2.2	25....	2.85	2.70	2.0	2.0	2.0	2.2
11....	2.70	2.98	2.0	2.0	2.0	2.2	26....	3.00	2.68	2.0	2.0	2.0	2.2
12....	2.60	2.95	2.0	2.0	2.0	2.2	27....	2.85	2.60	2.05	2.0	2.0	2.2
13....	2.48	3.00	2.0	2.0	2.0	2.2	28....	2.90	2.40	2.0	2.0	2.0	2.2
14....	2.78	3.05	2.1	2.0	2.0	2.2	29....	2.75	2.45	2.0	2.05	2.0	2.2
15....	2.98	3.15	2.15	2.0	2.0	2.2	30....	2.70	2.45	2.05	2.05	2.05	2.2
							31....	2.65	....	2.0	2.05	....	2.2

Daily discharge, in second-feet, of Cow Creek near Saratoga, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1....	25	129	30	2	5	16	16....	143	218	5	2	2	8
2....	25	116	20	2	5	16	17....	134	204	5	2	2	8
3....	30	147	20	2	5	14	18....	134	184	2	2	2	8
4....	30	180	28	2	5	25	19....	139	143	2	2	2	8
5....	30	162	30	2	2	25	20....	129	143	5	2	2	8
6....	66	184	44	2	3	24	21....	125	134	2	2	2	8
7....	82	183	13	2	2	13	22....	98	129	2	5	2	8
8....	107	193	2	2	2	10	23....	82	107	2	2	2	8
9....	152	197	2	2	2	8	24....	98	98	2	2	2	8
10....	152	142	2	5	2	8	25....	116	90	2	2	2	8
11....	90	126	2	2	2	8	26....	143	87	2	2	2	8
12....	74	121	2	2	2	8	27....	116	74	5	2	2	8
13....	56	129	2	2	2	8	28....	125	44	2	2	2	8
14....	104	143	8	2	2	8	29....	98	52	2	5	2	8
15....	139	160	13	2	2	8	30....	86	52	5	5	5	8
							31....	78	....	2	5	....	8

NOTE.—Daily discharge determined as follows: May 3 to 29 and June 21 to Sept. 30 from curve fairly well defined at all gage heights; Oct. 7 to 31, from poorly-defined curve; May 30 to June 20 and Oct. 1 to 6 by indirect method for shifting channels.

Monthly discharge of Cow Creek near Saratoga, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	152	25	97.0	5,960	C.
June	218	44	136	8,090	C.
July	44	2	8.5	523	C.
August	5	2	2.5	154	C.
September	5	2	2.5	149	C.
October	25	8	10.5	646	C.
The period				15,500	

SPRING CREEK NEAR SARATOGA, WYO.

Location.—At highway bridge, in sec. 23, T. 17 N , R. 84 W., and 2 miles southwest of Saratoga. There is no tributary between the station and the mouth, three-fourths of a mile below.

Records available.—May 3 to October 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 5 second-feet from Spring Creek, 85 second-feet from North Spring Creek, and 104 second-feet from South Spring Creek. These diversions are all above the station.

Accuracy.—Owing to the somewhat shifting channel the estimates of discharge can not be considered better than fair or possibly good.

Cooperation.—Station maintained in cooperation with the State engineer.

Dicharge measurements of Spring Creek near Saratoga, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 3	Fletcher and Kingdon	1.00	41.3	June 20	R. H. Fletcher	2.05	219
29	R. H. Fletcher	2.00	176	July 11	do	.52	[a] 1.5
June 10	do	3.00	356	Oct. 6	G. H. Russell	1.23	56.0

[a] Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Spring Creek near Saratoga, Wyo., for 1911.

[Vada Lyons, observer.]

Day.	May.		June.		July.		August.		September.		October.	
	Gage. height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	....	35	2.0	175	1.1	62	0.5	6	0.2	1	0.9	27
2	....	35	2.3	225	1.15	70	.45	5	.2	1	.9	27
3	1.0	41	2.2	208	1.0	50	.4	4	....	0	1.0	37
4	1.0	41	2.25	216	.9	40	.4	4	....	0	.9	25
5	1.05	46	2.25	216	.8	25	.4	4	....	0	.95	29
6	1.2	63	2.35	232	.8	25	.4	4	....	0	1.2	52
7	1.4	87	2.35	232	.75	21	.4	4	....	0	1.0	31
8	1.5	100	2.6	278	.65	13	....	0	....	0	.9	21
9	1.75	136	3.0	356	.5	7	....	0	....	0	.9	21
10	1.95	167	2.7	297	.5	7	....	0	....	0	.9	21
11	1.85	151	2.2	217	.5	6	....	0	....	0	.9	21
12	1.55	107	2.25	227	.5	6	.6	9	....	0	.9	21
13	1.55	107	2.15	210	.5	6	.6	9	.6	9	.9	21
14	1.75	136	2.4	263	.7	13	.5	6	.6	9	.9	21
15	2.0	175	2.45	271	.7	13	.4	4	.6	9	.9	21
16	1.95	167	2.4	263	.7	13	.5	6	.65	11	.9	21
17	2.1	191	2.9	368	.7	13	.5	6	.7	13	.9	21
18	2.1	191	2.6	310	.65	11	.5	6	.7	13	.9	21
19	2.05	183	2.2	237	.6	9	.45	5	.6	9	.9	21
20	2.0	175	2.15	236	.6	9	.45	5	.6	9	.9	21
21	1.8	143	2.25	254	.6	9	.5	6	.6	9	.9	21
22	1.6	114	2.1	228	.6	9	.5	6	.6	9	.9	21
23	1.6	114	1.95	192	.6	9	.6	9	.6	9	.9	21
24	1.55	107	1.8	168	.6	9	.5	6	.6	9	.9	21
25	1.7	128	1.55	130	.6	9	.55	7.5	.6	9	.9	21
26	1.85	151	1.45	115	.55	7.5	.5	6	.6	9	.9	21
27	1.9	159	1.3	95	.5	6	.5	6	.6	9	.9	21
28	1.85	151	1.1	70	.5	6	.45	5	.7	13	.9	21
29	1.8	143	1.15	70	.5	6	.4	4	.7	13	.9	21
30	1.8	143	1.1	62	.5	6	.25	1.5	.7	13	.9	21
31	1.95	167	....	....	.5	6	.2	1	....	....	.9	21

NOTE.—Daily discharge determined as follows: May 3 to June 10, July 12 to Sept. 30, and Oct. 7 to 31 from rating curves poorly defined; all other periods by indirect method for shifting channels. Channel dry Aug. 8 to 11 and Sept. 3 to 12.

Monthly discharge of Spring Creek near Saratoga, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	191	35	124	7,620	C.
June	368	62	214	12,700	C.
July	70	6	16.2	996	C.
August	9	0	4.7	289	C.
September	13	0	6.2	369	C.
October	52	21	23.6	1,450	C.
The period	....	....	....	23,400	

JACK CREEK NEAR SARATOGA, WYO.

Location.—At Burdick's ranch, in sec. 28, T. 18 N., R. 84 W., about 5 miles northwest of Saratoga. There is no tributary between the station and the mouth, 1 mile below. There is no tributary for a distance of several miles above.

Records available.—April 26 to October 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made from private bridge.

Winter flow.—Ice causes backwater during the winter months, and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 92 second-feet from Jack Creek. These diversions are all above the station.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Jack Creek near Saratoga, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 26	Fletcher and Kingdon	1.55	37.9	June 20	R. H. Fletcher	1.72	54.1
May 28	R. H. Fletcher	1.65	45.2	July 13	.....do	.78	1.7
June 9	.....do	2.20	100	Oct. 6	G. H Russell	1.50	31.9

Daily gage height, in feet, of Jack Creek near Saratoga, Wyo., for 1911.

[Mrs A. E. Dahl, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		1.68	1.70	0.92	0.60	0.60	0.95
2		1.62	1.70	.92	.60	.60	1.00
3		1.60	1.78	.98	.55	.60	1.00
4		1.62	1.72	.92	.55	.60	1.00
5		1.72	1.70	.95	.55	.60	1.10
6		1.92	1.70	.92	.55	.65	1.50
7		2.05	1.70	.90	.55	.65	1.30
8		2.00	1.70	.90	.55	.65	1.20
9		2.30	2.10	.82	.55	.60	1.10
10		2.30	2.05	.80	.55	.60	1.10
11		2.00	1.80	.78	.60	.60	1.10
12		1.90	1.72	.72	.60	.60	1.10
13		1.90	1.62	.68	.60	.60	1.05
14		2.05	1.65	.65	.60	.60	1.05
15		2.15	1.85	.65	.60	.60	1.05
16		2.15	2.30	.65	.60	.60	1.10
17		2.05	2.60	.65	.65	.65	1.05
18		1.95	1.95	.68	.60	.65	1.05
19		1.90	1.80	.70	.60	.65	1.05
20		1.85	1.70	.70	.60	.65	1.05
21		1.80	1.72	.70	.60	.65	1.05
22		1.65	1.68	.70	.60	.65	1.05
23		1.60	1.62	.70	.72	.65	1.05
24		1.65	1.52	.70	.70	.70	1.05
25		1.65	1.50	.70	.68	.70	1.05
26	1.58	1.70	1.48	.70	.60	.70	1.10
27	1.65	1.75	1.32	.68	.60	.90	1.10
28	1.68	1.68	1.15	.65	.60	.85	1.10
29	1.72	1.65	1.10	.62	.60	.80	1.10
30	1.70	1.60	.92	.60	.60	.85	1.10
31		1.65		.60	.60		1.10

Daily discharge, in second-feet, of Jack Creek near Saratoga, Wyo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		47	49	4.6	0.5	0.5	5.5
2		43	49	4.6	.5	.5	7.0
3		41	56	6.4	.2	.5	7.0
4		43	51	4.6	.2	.5	7.0
5		51	49	5.5	.2	.5	11
6		69	49	4.6	.2	.8	34
7		82	49	4.0	.2	.8	21
8		77	49	4.0	.2	.8	16
9		111	66	2.4	.2	.5	11
10		111	82	2.0	.2	.5	11
11		77	58	1.8	.5	.5	11
12		67	51	1.2	.5	.5	11
13		67	43	.9	.5	.5	9.0
14		82	45	.8	.5	.5	9.0
15		94	62	.8	.5	.5	9.0
16		94	111	.8	.5	.5	11
17		82	149	.8	.8	.8	9.0
18		72	72	.9	.5	.8	9.0
19		67	58	1.0	.5	.8	9.0
20		62	49	1.0	.5	.8	9.0
21		58	51	1.0	.5	.8	9.0
22		45	47	1.0	.5	.8	9.0
23		41	43	1.0	1.2	.8	9.0
24		45	35	1.0	1.0	1.0	9.0
25		45	34	1.0	.9	1.0	9.0
26	40	49	33	1.0	.5	1.0	11
27	45	54	22	.9	.5	4.0	11
28	47	47	14	.8	.5	3.0	11
29	51	45	11	.6	.5	2.0	11
30	49	41	4.6	.5	.5	3.0	11
31		45		.5	.5		11

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of Jack Creek near Saratoga, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy
	Maximum.	Minimum.	Mean.		
April 26-30			46.4	460	B.
May	111	41	63.0	3,870	B.
June	149	4.6	52.1	3,100	B.
July	6.4	.5	2.00	123	C.
August	1.2	.2	.48	30	C.
September	4.0	.5	.98	58	C.
October	34	5.5	10.9	670	B.
November			[a] 8.00	476	D.
December			[a] 6.00	369	D.
The period				9,160	

[a] Estimated.

PASS CREEK NEAR WALCOTT, WYO.

Location.—At Crone's ranch, 4 miles south of Walcott. There is no important tributary between the station and the mouth, several miles below.

Records available.—May 4 to October 4, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Pass Creek of 155 second-feet, and from tributaries, 33 second-feet. It is probable that the greater part of the diversions is above the station.

Accuracy.—Conditions are favorable for accurate results, and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Pass Creek near Walcott, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 4	Fletcher and Kingdon	2.05	20.6	June 19	R. H. Fletcher	3.00	88.9
28	R. H. Fletcher	2.30	39.9	July 10	do	1.28	[a] 1.0
June 9	do	1.90	17.3	Oct. 4	G. H. Russell	1.39	1.0

[a] Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Pass Creek near Walcott, Wyo. for 1911.

[A. Crone, observer.]

Day.	May.		June.		July.		Day	May.		June.		July.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1		20	2.10	25	1.35	1.0	16		27	3.35	118	1.2	.0
2		20	2.2	31	1.3	.5	17		28	4.7	241	1.2	.0
3		21	2.2	31	1.3	.5	18		28	4.25	198	1.2	.0
4	2.05	22	2.15	28	1.3	.5	19		29	2.9	81	1.2	.0
5		22	2.0	20	1.3	.5	20		29	2.75	69	1.2	.0
6		22	1.95	18	1.3	.5	21		30	2.45	48	1.2	.0
7		23	1.95	18	1.3	.5	22		30	2.45	48	1.2	.0
8		23	1.9	15	1.25	.2	23		31	2.25	34	1.2	.0
9		24	1.9	15	1.2	.0	24		31	2.4	44	1.2	.0
10		24	2.3	37	1.25	.2	25		32	2.25	34	1.2	.0
11		25	2.05	22	1.25	.2	26		32	1.65	6.8	1.1	.0
12		25	1.95	18	1.25	.2	27		33	1.6	5.5	1.1	.0
13		26	2.25	34	1.2	.0	28	2.25	34	1.5	3.5		.0
14		26	2.2	31	1.2	.0	29	2.1	25	1.45	2.5		.0
15		27	1.6	5.5	1.2	.0	30	2.0	20	1.45	2.5		.0
							31	2.0	20				.0

NOTE.—Daily discharge determined from a rating curve fairly well defined below 90 second-feet. Discharge interpolated May 1 to 3 and May 5 to 27. No flow during August and September.

Monthly discharge of Pass Creek near Walcott, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	34	20	26.1	1,600	C.
June	241	2.5	42.8	2,550	B.
July	1	.0	.15	9.2	B.
August			0	0	
September			0	0	
The period				4,160	

MEDICINE BOW RIVER NEAR MEDICINE BOW, WYO.

Location.—At Johnson's ranch, in sec. 7, T. 20 N., R. 79 W., 14 miles southwest of Medicine Bow. The nearest tributary enters 3 miles below.

Records available.—June 4 to November 4, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Slightly shifting.

Discharge measurements.—Made from bridge and by wading.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Medicine Bow River of 230 second-feet, a large portion of which are above the station.

Accuracy.—Conditions are favorable for good results and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the State engineer and with Johnson & Crownberg.

Discharge measurements of Medicine Bow River near Medicine Bow, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 4	Fletcher and Whiting	6.90	676	June 28	J. A. Whiting	5.80	158
13	R. H. Fletcher	6.87	637	July 14	R. H. Fletcher	5.05	7.3
23	do	6.50	492	Oct. 8	G. H. Russell	5.39	28.0

Daily gage height, in feet, of Medicine Bow River near Medicine Bow, Wyo., for 1911.

[Mrs. S. W. Johnson, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		5.7	5.0		5.22	5.27	16	7.6	5.15	4.8	4.82	5.52	
2		5.75	5.0		5.22	5.27	17	7.8	5.15	4.8	5.32	5.47	
3		5.7	5.0		5.32	5.27	18	7.6	5.15	4.8	5.32	5.42	
4	6.9	5.7	4.95		5.32	5.27	19	7.1	5.15	4.75	5.32	5.42	
5	7.2	5.6	4.95		5.42		20	6.9	5.25	4.75	4.92	5.42	
6	7.2	5.55	4.95		5.47		21	6.9	5.25	4.75	4.92	5.37	
7	7.1	5.45	4.95		5.72		22	6.8	5.25	4.75	4.92	5.37	
8	7.05	5.35	4.9	4.82	5.67		23	6.55	5.25	4.75	4.92	5.37	
9	7.8	5.35	4.9	4.82	5.67		24	6.45	5.25	4.85	4.92	5.37	
10	6.7	5.35	4.9	4.82	5.62		25	6.3	5.2	4.85	4.97	5.37	
11	6.85	5.35	4.9	4.82	5.62		26	6.15	5.15	4.85	5.07	5.32	
12	6.85	5.3	4.85	4.82	5.62		27	6.0	5.15	4.85	5.17	5.32	
13	6.9	5.25	4.85	4.82	5.57		28	5.9	5.1	4.95	5.27	5.32	
14	6.9	5.2	4.85	4.82	5.57		29	5.8	5.1	4.9	5.27	5.32	
15	6.95	5.15	4.8	4.82	5.57		30	5.75	5.05		5.27	5.32	
							31		5.05			5.27	

NOTE.—Channel dry Aug. 30 to Sept. 7.

Daily discharge, in second-feet, of Medicine Bow River near Medicine Bow, Wyo., for 1911.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	128	5.0	0.0	18	10	16	1,080	14	1.0	1.2	42	....
2	....	145	5.0	.0	18	10	17	1,200	14	1.0	36	35	....
3	....	128	5.0	.0	25	10	18	1,080	14	1.0	36	28	....
4	680	128	3.5	.0	25	10	19	790	14	.0	36	28	....
5	845	98	3.5	.0	35	....	20	680	26	.0	2.6	28	....
6	845	85	3.5	.0	40	....	21	680	26	.0	2.6	22	....
7	790	61	3.5	.0	95	....	22	626	26	.0	2.6	22	....
8	762	41	2.0	1.2	70	....	23	496	26	.0	2.6	22	....
9	1,200	41	2.0	1.2	70	....	24	445	26	1.5	2.6	22	....
10	573	41	2.0	1.2	60	....	25	372	19	1.5	4.1	22	....
11	653	41	2.0	1.2	60	....	26	304	14	1.5	8.5	16	....
12	653	32	1.5	1.2	60	....	27	240	14	1.5	16	16	....
13	680	26	1.5	1.2	50	....	28	200	10	3.5	28	16	....
14	680	19	1.5	1.2	50	....	29	162	10	2.0	28	16	....
15	708	14	1.0	1.2	50	....	30	145	7.5	.0	28	16	....
							31	....	7.5	.0	....	10	....

NOTE.—Daily discharge determined as follows: June 4 to Sept. 30 from fairly well defined rating curve; Oct. 9 to Nov. 4, curve poorly defined; Oct. 1 to 8, by indirect method for shifting channels.

Monthly discharge of Medicine Bow River near Medicine Bow, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 4-30	1,200	145	651	34,900	B.
July	145	7.5	41.8	2,570	B.
August	5.0	.0	1.84	113	B.
September	36	.0	8.15	485	B.
October	95	10	35.1	2,160	C.
November	....	....	[a] 10	595	D.
December	....	....	[a] 10	615	D.
The period	....	....	....	41,400	

[a] Estimated.

ROCK CREEK NEAR ARLINGTON, WYO.

Location.—At highway bridge in sec. 25, T. 19 N., R. 79 W., 1¼ miles upstream from Arlington post office; 1 mile below the mouth of Overland Creek, the nearest tributary.

Records available.—April 22 to November 4, 1911.

Drainage area.—70 square miles (measured from Forest Service Atlas).

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—One small ditch diverts water above the station for irrigation.

Accuracy.—As the channel shifts the estimates have been obtained by the indirect method and can be considered only fair except for those months when the measurements indicated no shift, when they are probably good.

Cooperation.—Station maintained in cooperation with the State engineer and the Rock Creek Conservation Co.

Discharge measurements of Rock Creek near Arlington, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 26	Fletcher and Whiting	2.80	486	July 9	Fletcher and Cummings	1.60	98.5
June 3	.....do	3.10	686	23	F. T. Cummings	1.40	61.8
7	Fletcher and Cummings	3.45	995	Aug. 22	.....do	1.20	28.8
18	Fletcher and Whiting	2.60	465	Nov. 3	.....do	1.30	23.5
27	J. A. Whiting	2.30	200				

Daily gage height, in feet, of Rock Creek near Arlington, Wyo., for 1911.

[Leon Clearwater, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1.5	3.1	2.2	1.4	1.2	1.1	1.4
2	....	1.4	3.4	2.1	1.4	1.1	1.2	1.4
3	....	1.4	3.1	1.9	1.4	1.2	1.1	1.4
4	....	1.5	3.2	1.8	1.3	1.2	1.1	1.3
5	....	1.6	3.3	1.8	1.4	1.1	1.1	....
6	....	1.6	3.5	1.8	1.4	1.3	1.2	....
7	....	1.9	3.9	1.7	1.3	1.2	1.3	....
8	....	2.0	3.6	1.8	1.3	1.1	1.3	....
9	....	2.4	3.1	1.6	1.3	1.1	1.4	....
10	....	2.5	2.9	1.6	1.4	1.0	1.4	....
11	....	2.0	2.8	1.6	1.3	1.0	1.3	....
12	....	2.2	2.7	1.7	1.3	1.0	1.4	....
13	....	2.2	2.9	1.6	1.2	1.0	1.4	....
14	....	2.3	3.0	1.6	1.3	1.0	1.4	....
15	....	2.3	3.1	1.5	1.3	1.0	1.4	....
16	....	2.5	3.3	1.6	1.2	1.1	1.4	....
17	....	2.6	3.6	1.6	1.1	1.1	1.4	....
18	....	2.7	2.8	1.5	1.2	1.2	1.4	....
19	....	2.8	2.8	1.6	1.1	1.1	1.5	....
20	....	2.4	3.0	1.5	1.2	1.1	1.4	....
21	....	2.3	3.1	1.4	1.1	1.1	1.4	....
22	1.1	2.2	2.8	1.4	1.2	1.0	1.4	....
23	1.2	2.3	2.6	1.4	1.3	1.1	1.4	....
24	1.2	2.4	2.5	1.4	1.2	1.1	1.4	....
25	1.3	2.5	2.4	1.4	1.2	1.1	1.4	....
26	1.3	2.8	2.2	1.4	1.2	1.1	1.4	....
27	1.4	2.9	2.2	1.4	1.15	1.0	1.4	....
28	1.5	2.5	2.4	1.4	1.1	1.0	1.4	....
29	1.6	2.6	2.5	1.3	1.1	1.0	1.4	....
30	1.5	2.9	2.3	1.4	1.1	1.1	1.4	....
31	....	3.0	....	1.4	1.2	....	1.3	....

Daily discharge, in second-feet, of Rock Creek near Arlington, Wyo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	72	690	195	57	33	24	35
2	....	57	950	170	57	24	33	35
3	....	57	690	140	57	33	24	35
4	....	72	770	120	44	33	24	26
5	....	89	860	120	57	24	24	....
6	....	89	1,050	127	57	44	33	....
7	....	148	1,450	107	44	33	44	....
8	....	171	1,150	127	44	24	44	....
9	....	294	690	89	44	24	57	....
10	....	335	590	89	57	17	57	....
11	....	171	520	89	44	17	40	....
12	....	226	460	107	44	17	52	....
13	....	226	600	89	33	17	52	....
14	....	258	700	89	44	17	52	....
15	....	258	780	72	44	17	52	....
16	....	335	1,000	89	33	24	52	....
17	....	380	1,310	89	24	24	52	....
18	....	430	590	72	33	33	52	....
19	....	490	590	89	24	24	64	....
20	....	294	640	72	33	24	52	....
21	....	258	720	57	24	24	43	....
22	24	226	510	57	33	17	43	....
23	33	258	340	57	44	24	43	....
24	33	294	300	57	33	24	43	....
25	44	335	270	57	33	24	43	....
26	44	490	175	57	33	24	43	....
27	57	550	175	57	28	17	43	....
28	72	335	230	57	24	17	43	....
29	89	380	265	44	24	17	43	....
30	72	550	220	57	24	24	43	....
31	....	620	....	57	33	....	33	....

NOTE.—Daily discharge determined as follows: Apr. 22 to June 7 and July 10 to Oct. 5, from poorly defined rating curve; June 8 to July 9 and Oct. 6 to Nov. 4, by indirect method for shifting channels.

Monthly discharge of Rock Creek near Arlington, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
Apr. 22-30	89	24	52.0	928	C.
May	620	57	282	17,300	C.
June	1,450	175	643	38,300	C.
July	195	44	88.9	5,470	C.
August	57	24	38.9	2,390	C.
September	44	17	23.8	1,420	C.
October	64	24	43.5	2,670	C.
The period				68,500	

ROCK CREEK NEAR ROCK RIVER, WYO.

Location.—At Phelan's ranch, in sec. 6, T. 20 N., R. 76 W., 1 mile southeast of Rock River. No important tributary between the station and the mouth, several miles below.

Records available.—March 25 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made from private bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Rock Creek of 232 second-feet, and from tributaries, 73 second-feet, chiefly above the station.

Accuracy.—As the channel shifts the estimates have been obtained by the indirect method and can be considered only fair.

Cooperation.—Station maintained in cooperation with the State engineer and the Rock Creek Conservation Co.

Discharge measurements of Rock Creek near Rock River, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 26	Fletcher and Whiting	1.60	200	June 25	Whiting and Cummings	1.60	238
June 2	.....do	2.40	568	July 8	Fletcher and Whiting	.70	24.2
8	Fletcher and Cummings	2.80	762	22	F. T. Cummings	.50	18.0
17	Fletcher and Whiting	3.30	896	Nov. 4	.....do	.80	[a] 10.0

[a] Estimated.

Daily gage height, in feet, of Rock Creek near Rock River, Wyo., for 1911.

[E. E. Clark, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.8	0.4	2.0	1.2	0.2		0.3	0.6	0.9
2		.8	.4	2.3	1.2	.2		.3	.7	.9
3		.8	.4	2.2	1.2	.3		.3	.8	.9
4		.7	.5	2.45	1.2	.4		.4	.8	.9
5		.7	.4	2.5	1.1	.4		.4	.8	.9
6		.7	.4	2.4	1.0	.4		.3	.8	.9
6		.6	.4	3.0	1.0	.4		.3	.8	.9
8		.5	.4	3.0	1.0	.4		.3	.8	.9
9		.5	.6	2.9	.9	.4		.4	.8	.9
10		.5	.8	2.5	.8	.4		.4	.8	.9

Daily gage height, in feet, of Rock Creek near Rock River, Wyo., for 1911—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	....	0.5	1.0	2.0	.8	0.4	....	0.4	0.8	0.9
12	....	.3	1.0	2.0	.8	.4	....	.4	.8	.9
13	....	.3	1.0	2.1	.8	.3	....	.4	8	.9
14	....	.3	1.1	2.1	.7	.3	....	.4	.8	.9
15	....	.3	1.1	2.0	.7	.2	....	.4	.8	.9
16	....	.3	1.3	3.0	.7	.4	....	.4	.8	.9
17	....	.3	1.4	3.3	.7	.6	....	.4	.8	.9
18	....	.3	1.5	2.0	.8	.6	....	.3	.8	.9
19	....	.3	1.5	2.0	.7	.6	....	....	.8	.9
20	....	.3	1.5	2.0	.7	.6	....	.3	.8	.9
21	....	.3	1.4	2.95	.6	.6	....	.4	.8	.9
22	....	.4	1.4	2.85	.6	.6	....	.4	.8	.9
23	....	.4	1.4	2.0	.6	.5	....	.5	.8	.9
24	....	.4	1.4	1.5	.6	.5	....	.5	.8	.9
25	1.3	.4	1.4	1.5	.3	.4	....	.5	.8	.9
26	1.3	.4	1.6	1.5	....	.4	0.1	.5	.9	.9
27	1.4	.3	1.7	1.3	....	.3	.1	.5	.9	.9
28	1.5	.4	1.5	1.3	....	.2	.2	.5	.9	.9
29	1.3	.4	1.5	1.2	....	....	.3	.5	.9	.9
30	1.0	.4	1.6	1.2	.2	....	.3	.5	.9	.9
31	.8	....	2.0	....	.2	....	....	.6	....	.9

NOTE.—Channel dry July 26–29 and Aug. 29 to Sept. 25. River frozen over Nov. 2 to Dec. 31. Gage heights were read to top of ice and do not represent the discharge.

Daily discharge, in second-feet, of Rock Creek near Rock River, Wyo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	37	3	383	110	4	0	7	25
2	....	37	3	515	110	4	0	7	....
3	....	37	3	470	110	7	0	7	....
4	....	25	8	584	110	11	0	11	....
5	....	25	3	607	90	11	0	11	....
6	....	25	3	560	67	11	0	7	....
7	....	15	3	857	67	11	0	7	....
8	....	8	3	857	67	11	0	7	....
9	....	8	15	800	51	11	0	11	....
10	....	8	37	580	37	11	0	11	....
11	....	8	67	360	37	11	0	11	....
12	....	1	67	360	45	11	0	11	....
13	....	1	67	380	45	7	0	11	....
14	....	1	85	380	30	7	0	11	....
15	....	1	85	340	30	4	0	11	....
16	....	1	127	780	37	11	0	11	....
17	....	1	151	900	37	25	0	11	....
18	....	1	176	305	52	25	0	7	....
19	....	1	176	330	37	25	0	7	....
20	....	1	176	330	35	25	0	7	....
21	....	1	151	780	25	25	0	11	....
22	....	3	151	730	25	25	0	11	....
23	....	3	151	370	25	17	0	17	....
24	....	3	151	200	25	17	0	17	....
25	127	3	151	210	7	11	0	17	....
26	127	3	202	210	7	11	1	17	....
27	151	1	229	140	6	7	1	17	....
28	176	3	190	140	5	4	4	17	....
29	127	3	190	120	4	0	7	17	....
30	67	3	230	120	4	0	7	17	....
31	37	....	360	....	4	0	....	25	....

NOTE.—Daily discharge determined as follows: June 3–8 and July 23 to Nov. 1, from fairly well defined rating curve; Mar. 25 to May 26 from a poorly defined rating curve; all other periods by indirect method for shifting channels.

Monthly discharge of Rock Creek near Rock River, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 25-31	176	37	116	1,610
April	37	1	8.9	530
May	360	3	110	6,760
June	900	120	457	27,200
July	110	4	43.2	2,660
August	25	0	11.6	713
September	7	0	.7	42
October	25	7	11.8	726
The period				40,200

BOXELDER CREEK NEAR CAREYHURST, WYO.

Location.—At highway bridge in sec. 7, T. 33 N., R. 73 W., 1 mile south of Careyhurst. No tributary between the station and the mouth, 1 mile below. The nearest tributary is a small stream about 2 miles above.

Records available.—May 17 to October 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Boxelder Creek of 51 second-feet, and from the tributaries, 46 second-feet. All these diversions are above the station.

Accuracy.—As only three discharge measurements have been made the estimates of flow can be considered only fair.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Boxelder Creek near Careyhurst, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 18	R. H. Fletcher	3.00	105
June 21	E. O. Christiansen	2.81	80.0
Oct. 13	G. H. Russell	2.06	2.7

Daily gage height, in feet, of Boxelder Creek near Careyhurst, Wyo., for 1911.

[R. D. Moffett, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1		2.6	2.25	1.9	1.9	1.9	16		2.5	1.9	1.9	1.9	2.1
2		2.6	2.1	1.9	1.9	1.9	17	3.0	3.15	1.9	1.9	1.9	2.1
3		2.55	2.05	1.9	1.9	1.9	18	3.0	2.9	2.0	1.9	1.9	2.2
4		2.35	1.95	1.9	1.9	1.95	19	3.0	2.75	2.0	1.9	1.9	2.2
5		2.25	1.9	1.9	1.9	1.9	20	3.0	2.75	2.0	1.9	1.9	2.2
6		2.15	1.9	2.0	1.9	1.9	21	2.9	2.8	2.3	1.9	1.9	2.2
7		2.1	1.9	1.95	1.9	1.9	22	2.9	2.75	2.1	1.9	1.9	2.2
8		2.1	1.9	1.9	1.9	2.05	23	2.8	2.7	2.05	1.9	1.9	2.2
9		2.2	1.9	1.9	1.9	2.05	24	2.7	2.65	1.95	1.9	1.9	2.2
10		2.15	1.9	1.9	1.9	2.05	25	2.65	2.6	1.9	1.9	1.9	2.3
11		2.1	1.9	1.9	1.9	2.0	26	2.6	2.6	1.9	1.9	1.9	2.3
12		2.0	1.9	1.9	1.9	2.0	27	2.6	2.5	1.9	1.9	1.9	2.3
13		2.0	1.9	1.9	1.9	2.0	28	2.6	2.45	1.9	1.9	1.9	2.3
14		2.0	1.9	1.9	1.9	2.0	29	2.6	2.35	1.9	1.9	1.9	2.3
15		2.0	1.9	1.9	1.9	2.1	30	2.6	2.3	1.9	1.9	1.9	2.3
							31	2.6		1.9	1.9		2.3

Daily discharge, in second-feet, of Boxelder Creek near Careyhurst, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	54	16	0.0	0.0	0.0	16	....	42	0.0	0.0	0.0	4.5
2	....	54	4.5	.0	.0	.0	17	105	126	.0	.0	.0	4.5
3	....	48	3.0	.0	.0	.0	18	105	92	1.5	.0	.0	11
4	....	26	.8	.0	.0	.8	19	105	72	1.5	.0	.0	11
5	....	16	.0	.0	.0	.0	20	105	72	1.5	.0	.0	11
6	....	7.8	.0	1.5	.0	.0	21	92	79	20	.0	.0	11
7	....	4.5	.0	.8	.0	.0	22	92	72	4.5	.0	.0	11
8	....	4.5	.0	.0	.0	3.0	23	79	66	3.0	.0	.0	11
9	....	11	.0	.0	.0	3.0	24	66	60	.8	.0	.0	11
10	....	7.8	.0	.0	.0	3.0	25	60	54	.0	.0	.0	20
11	....	4.5	.0	.0	.0	1.5	26	54	54	.0	.0	.0	20
12	....	1.5	.0	.0	.0	1.5	27	54	42	.0	.0	.0	20
13	....	1.5	.0	.0	.0	1.5	28	54	36	.0	.0	.0	20
14	....	1.5	.0	.0	.0	1.5	29	54	26	.0	.0	.0	20
15	....	1.5	.0	.0	.0	4.5	30	54	20	.0	.0	.0	20
							31	54	....	.0	.0	....	20

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of Boxelder Creek near Caryhurst, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 17-31	105	54	75.5	2,250	C.
June	126	1.5	38.6	2,300	C.
July	20	.0	1.84	113	C.
August	1.5	.0	.07	4.3	C.
September	.0	.0	.00	.0	C.
October	20	.0	7.92	487	C.
November	....	....	[a] 12	714	D.
December	....	....	[a] 8	492	D.
The period	....	....	....	6,360	

[a] Estimated.

LARAMIE RIVER AT GLENDEVEY, COLO.

Location.—At highway bridge one-eighth mile west of Glendevey in sec. 36, T. 10 N., R. 76 W., in the Medicine Bow National Forest; McIntyre Creek enters a short distance below and Spring Creek above.

Records available.—June 24, 1904, to October 31, 1905; August 18, 1910, to November 30, 1911.

Drainage area.—102 square miles[1] (measured from Clason's 1911 sectional map of Colorado).

Gage.—Automatic gage installed by the State engineer November 17, 1910, replaced vertical staff previously used. The datum of the gages has remained constant.

Channel.—Permanent.

Discharge measurements.—Made from cable at bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 65 second-feet from Laramie River above the station and for 749 second-feet from tributaries entering above. Of this latter amount 688 second-feet are for diversion into the Cache La Poudre basin.

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[1] Revised since previous reports.

Accuracy.—Conditions are favorable for excellent results, and the estimates should be reliable.

Cooperation.—Since its reestablishment the station has been maintained in cooperation with the State engineer and the United States Forest Service.

Discharge measurements of Laramie River at Glendevey, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 14	C. E. Turner	2.90	288	Aug. 20	C. E. Turner	2.04	41.4
July 8	.....do	2.78	232	Sept. 17	.....do	1.84	23.1
18	.....do	2.30	88.2	Oct. 7	.....do	2.12	53.4
23	.....do	2.35	96.0	18	C. C. Hezmalhalch	1.95	30.1
Aug. 18	.....do	2.00	36.1				

Daily gage height, in feet, of Laramie River at Glendevey, Colo., for 1911.

[Albert L. Fairhurst, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.75	1.6	1.8	1.85	2.3	3.25	2.6	2.1	1.9	2.3	1.7
2	1.8	1.6	1.8	1.9	2.25	3.35	2.85	2.1	1.9	2.15	1.75
3	1.9	1.7	1.7	1.95	2.25	3.25	2.85	2.1	1.9	2.1	1.75
4	1.85	1.8	1.75	1.95	2.3	3.25	2.9	2.1	1.95	2.05	1.8
5	1.75	1.8	1.8	1.9	2.5	3.3	2.85	2.1	1.9	2.15	1.8
6	1.85	1.75	1.8	1.9	2.5	3.3	2.85	2.05	1.95	2.3	1.75
7	1.8	1.7	1.8	1.75	2.65	3.45	2.85	2.05	1.9	2.25	1.85
8	1.7	1.6	1.8	1.8	2.85	3.35	2.7	2.0	1.9	2.2	1.85
9	1.65	1.65	1.8	1.9	3.0	3.65	2.7	2.0	1.9	2.1	1.85
10	1.65	1.75	1.8	1.9	2.9	3.25	2.45	2.0	1.85	2.05	1.9
11	1.6	1.8	1.8	1.9	2.65	3.2	2.3	2.05	1.8	1.95	1.9
12	1.7	1.75	1.8	1.85	2.7	3.2	2.25	2.05	1.8	1.9	1.9
13	1.8	1.6	2.0	1.75	2.8	3.2	2.35	2.0	1.8	1.9	1.9
14	1.7	1.5	1.95	1.65	2.85	3.25	2.55	2.0	1.85	1.9	1.85
15	1.7	1.5	1.95	1.7	3.05	3.4	2.4	1.95	1.9	1.7	1.85
16	1.7	1.55	1.8	1.85	3.15	3.5	2.35	1.95	1.85	1.85	1.9
17	1.7	1.75	1.75	2.0	3.15	3.5	2.35	2.0	1.85	1.95	1.85
18	1.75	1.85	1.8	1.95	3.1	3.3	2.3	2.0	1.8	1.9	1.85
19	1.75	1.7	1.8	2.05	2.85	3.2	2.45	2.05	1.85	1.9	1.85
20	1.7	1.6	1.8	2.0	2.6	3.4	2.35	2.0	1.85	1.9	1.8
21	1.7	1.6	1.8	2.1	2.5	3.8	2.3	2.05	1.85	1.9	1.8
22	1.7	1.6	1.8	2.2	2.6	3.7	2.25	2.0	1.9	1.9	1.75
23	1.75	1.6	1.7	2.1	2.65	3.7	2.35	2.15	2.15	1.9	1.8
24	1.75	1.65	1.8	2.1	2.85	3.6	2.3	2.0	1.95	1.9	1.75
25	1.75	1.7	1.85	2.25	2.9	3.2	2.25	2.0	1.9	1.8	1.8
26	1.75	1.65	1.9	2.3	2.85	2.9	2.25	1.95	1.85	1.75	1.8
27	1.8	1.6	1.8	2.3	3.0	2.9	2.25	1.9	1.9	1.8	1.7
28	1.85	1.6	1.8	2.25	3.0	2.75	2.25	1.9	1.95	1.8	....
29	1.8	....	1.9	2.2	3.05	2.7	2.2	1.9	1.95	1.8	....
30	1.75	....	1.85	2.2	3.05	2.65	2.15	1.85	2.05	1.75	....
31	1.65	....	1.7	....	3.15	....	2.1	1.85	....	1.75	....

Daily discharge, in second-feet, of Laramie River at Glendevey, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	16	10	19	22	84	461	166	49	26	84	14
2	19	10	19	26	74	517	264	49	26	57	16
3	26	14	14	31	74	461	264	49	26	49	16
4	22	19	16	31	84	461	285	49	31	42	19
5	16	19	19	26	135	488	264	49	26	57	19
6	22	16	19	26	135	488	264	42	31	84	16
7	19	14	19	16	184	576	264	42	26	74	22
8	14	10	19	19	264	517	201	36	26	65	22
9	12	12	19	26	332	705	201	36	26	49	22
10	12	16	19	26	285	461	122	36	22	42	26

Daily discharge, in second-feet, of Laramie River at Glendevey, Colo., for 1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11	10	19	19	26	184	434	84	42	19	31	26
12	14	16	19	22	201	434	74	42	19	26	26
13	19	10	36	16	242	434	96	36	19	26	26
14	14	8	31	12	264	461	150	36	22	26	22
15	14	8	31	14	357	546	108	31	26	14	22
16	14	9	19	22	408	606	96	31	22	22	26
17	14	16	16	36	408	606	96	36	22	31	22
18	16	22	19	31	382	488	84	36	19	26	22
19	16	14	19	42	264	434	122	42	22	26	22
20	14	10	19	36	166	546	96	36	22	26	19
21	14	10	19	49	135	812	84	42	22	26	19
22	14	10	19	65	166	740	74	36	26	26	16
23	16	10	14	49	184	740	96	57	57	26	19
24	16	12	19	49	264	670	84	42	31	26	16
25	16	14	22	74	285	434	74	36	26	19	19
26	16	12	26	84	264	285	74	31	22	16	19
27	19	10	19	84	332	285	74	26	26	19	14
28	22	10	19	74	332	222	74	26	31	19	15
29	19	....	26	65	357	201	65	26	31	19	15
30	16	....	22	65	357	184	57	22	42	16	15
31	12	....	14	....	408	....	49	22	....	16	....

NOTE.—Daily discharge determined from a rating curve well defined between 5 and 450 second-feet. Discharge estimated Nov. 27 to 30. Ice present Nov. 27 to Dec. 31.

Monthly discharge of Laramie River at Glendevey, Colo., for 1911.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	26	10	16.2	998	A.
February	22	8	12.9	607	A.
March	36	14	20.3	1,250	A.
April	84	12	38.8	2,310	A.
May	408	74	246	15,100	A.
June	812	184	490	29,200	A.
July	285	49	132	8,140	A.
August	57	22	37.8	2,320	A.
September	57	19	26.4	1,570	A.
October	84	14	35	2,150	A.
November	26	14	19.7	1,170	A.
December	....	....	[a] 12	738	D.
The year	812	8.0	98.0	65,600	

[a] Estimated.

LARAMIE RIVER NEAR JELM, WYO.

Location.—At highway bridge in sec. 15, T. 12 N., R. 77 W., 4 miles south of Jelm post office, one-fourth mile below the Colorado-Wyoming line.

Records available.—May 7 to November 30, 1911. From June 22, 1904, to October 31, 1905, a station was maintained at Decker's ranch, half a mile south of the State line. The records at the two stations are practically comparable as there are no tributaries nor diversions of any amount between.

Drainage area.—365 square miles (Clason's 1911 sectional map of Colorado).

Gage.—In 1911 an automatic recording gage was installed by the State engineer of Colorado. This is referred to the same datum as the vertical staff used at first.

Channel.—Practically permanent.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Between this station and that at Glendevey, Colo., there are court decrees for diversions of 236 second-feet from Laramie River and 204 second-feet from intervening tributaries. These diversions are all in Colorado.

Accuracy.—Conditions are favorable for accurate results, and the estimates should be excellent.

Cooperation.—Station maintained in cooperation with the State engineers of Colorado and Wyoming.

Discharge measurements of Laramie River near Jelm, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 7	Fletcher and Kingdon	2.15	382	July 14	C. E. Turner	1.83	254
15	C. E. Turner	2.60	677	15	R. H. Fletcher	1.60	197
June 6	R. H. Fletcher	3.00	1,060	20	C. E. Turner	1.60	182
15	do	2.80	890	Aug. 19	do	1.14	65.2
24	do	2.35	556	22	do	1.19	75.1
July 10	C. E. Turner	1.75	225	Sept. 19	B. S. Clayton	1.00	45.3
14	do	1.90	309	Oct. 8	C. E. Turner	1.31	93.0

Daily gage height, in feet, of Laramie River near Jelm, Wyo., for 1911.

[Mrs. C. D. Oviatt, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		2.80	1.85	1.30	1.00	1.30	1.05
2		2.90	2.30	1.30	1.00	1.30	1.05
3		2.90	2.30	1.30	1.00	1.15	1.15
4		2.85	2.10	1.30	1.05	1.10	1.20
5		2.95	2.20	1.30	1.05	1.20	1.20
6		2.90	2.20	1.25	1.00	1.45	1.30
7	2.15	2.85	2.05	1.20	1.00	1.35	1.30
8	2.35	2.95	2.00	1.20	1.00	1.25	1.25
9	2.50	3.15	1.85	1.15	1.00	1.20	1.20
10	2.60	2.80	1.70	1.20	1.00	1.20	1.20
11	2.20	2.75	1.40	1.25	.95	1.20	1.05
12	2.20	2.75	1.50	1.30	.95	1.15	1.10
13	2.40	2.70	1.55	1.20	.95	1.10	1.10
14	2.55	2.70	1.85	1.10	.95	1.10	1.20
15	2.65	2.70	1.70	1.00	1.00	1.15	
16	2.70	3.00	1.60	1.10	1.00	1.10	
17	2.75	3.00	1.65	1.20	1.00	1.15	
18	2.80	2.65	1.60	1.20	1.00	1.15	
19	2.70	2.55	1.55	1.15	.95	1.10	
20	2.50	2.85	1.60	1.15	.95	1.10	
21	2.30	2.85	1.55	1.20	1.00	1.15	
22	2.25	2.75	1.60	1.20	1.00	1.15	
23	2.25	2.50	1.55	1.35	1.15	1.10	
24	2.45	2.40	1.50	1.20	1.20	1.10	
25	2.60	2.30	1.45	1.15	1.00	1.10	
26	2.75	2.15	1.45	1.15	.95	1.10	
27	2.55	2.05	1.40	1.05	.90	1.15	
28	2.55	2.00	1.40	1.00	.90	1.10	
29	2.60	1.95	1.40	1.05	.90	1.10	
30	2.65	1.90	1.35	1.00	1.00	1.10	
31	2.75		1.35	1.00		1.10	

NOTE.—Gage heights distorted by ice Nov. 15 to Dec. 31.

Daily discharge, in second-feet, of Laramie River near Jelm, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		877	278	94	43	94	50
2		965	492	94	43	94	50
3		970	488	94	43	65	65
4		972	378	94	50	56	74
5		1,020	428	94	50	74	74
6		978	423	84	43	132	94
7	387	933	348	74	43	106	94
8	497	1,020	323	74	43	84	84
9	592	1,210	260	65	43	74	74
10	665	888	207	74	43	74	74
11	412	845	118	84	38	74	50
12	412	845	145	94	38	65	56
13	527	803	160	74	38	56	56
14	628	803	260	56	38	56	60
15	700	803	198	43	43	65	60
16	745	1,070	194	56	43	56	60
17	790	1,070	205	74	43	65	60
18	833	765	184	74	43	65	60
19	760	690	165	65	38	56	60
20	610	933	175	65	38	56	60
21	485	933	160	74	43	65	60
22	458	846	175	74	43	65	55
23	460	653	160	106	65	56	55
24	590	583	145	74	74	56	55
25	705	515	132	65	43	56	55
26	820	425	132	65	38	56	55
27	670	370	118	50	33	65	55
28	673	345	118	43	33	56	55
29	712	323	118	50	33	56	55
30	753	300	106	43	43	56	55
31	833		106	43		56	

NOTE.—Daily discharge determined from two rating curves well defined between 25 and 1,250 second-feet; indirect method for shifting channels was used from May 16 to June 6, June 25 to July 10, and July 15-20; discharge estimated Nov. 15 to 30. Ice present Nov. 15 to Dec. 31.

Monthly discharge of Laramie River near Jelm, Wyo., for 1911.

[Drainage area, 365 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
May 7-31	833	387	629	1.72	1.60	31,200	A.
June	1,210	300	792	2.17	2.42	47,100	A.
July	492	106	223	.611	.70	13,700	A.
August	106	43	71.4	.196	.23	4,390	A.
September	74	33	43.1	.118	.13	2,560	A.
October	132	56	68.1	.187	.22	4,180	A.
November	94	50	62.3	.171	.19	3,710	B.
December			[a] 50	.137	.16	3,070	D.
The period						110,000	

[a] Estimated.

LARAMIE RIVER AT WOODS LANDING, WYO.

Location.—At highway bridge at Woods Landing, in sec. 11, T. 13 N., R. 77 W., a short distance below the mouth of Wood Creek, the nearest tributary.

Records available.—May 7 to November 11, 1911. During 1889, 1890, and 1891 a station was maintained at Woods Landing by the State engineer, and the results were published in his reports. From April 12, 1896, to September 30, 1900, a station was maintained at a point 400 feet above the present site, and as no streams intervene nor ditches divert water the records at the two points are comparable.

Drainage area.—Not measured.

Gage.—Vertical staff; no determined relation between present gage and gages used prior to 1900.

Channel.—A short distance below the bridge there is a diversion dam which is the control point for the station. As this dam is not permanent conditions are somewhat changeable.

Discharge measurements.—Made from bridge during high stages and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Practically no water is diverted between the stations near Jelm and Woods Landing.

Cooperation.—During 1911 station was maintained in cooperation with the State engineer.

Discharge measurements of Laramie River at Woods Landing, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 7	Fletcher and Kingdon.	2.35	427	June 24	R. K. Fletcher.........	2.14	587
June. 6	R. K. Fletcher..........	2.74	1,060	July 15	.....do....................	1.54	196
15	.....do...................	2.54	927	Oct. 9	G. H. Russell...........	1.66	84.5

Daily gage height, in feet, of Laramie River at Woods Landing, Wyo., for 1911.

[Bessie Summers, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2.80	1.55	1.58	1.05	1.82	1.35
2	....	2.82	1.62	1.50	1.02	1.92	1.22
3	....	2.80	1.90	1.42	1.10	1.82	1.20
4	....	2.78	1.90	1.40	1.20	1.68	1.18
5	....	2.92	1.85	1.40	1.25	1.58	1.62
6	....	2.85	1.90	1.48	1.15	1.58	1.75
7	2.30	2.95	1.90	1.40	1.10	1.78	1.62
8	2.50	3.05	1.85	1.35	1.10	1.62	1.52
9	2.70	3.12	1.75	1.30	1.00	1.75	1.42
10	2.65	2.75	1.68	1.20	1.00	1.68	1.26
11	2.28	2.75	1.42	1.32	1.00	1.42	1.34
12	2.18	2.58	1.50	1.38	1.00	1.45	....
13	2.35	2.58	1.55	1.32	1.00	1.40	....
14	2.52	2.60	1.72	1.28	1.00	1.40	....
15	2.72	2.58	1.58	1.20	1.10	1.40	....
16	2.75	2.75	1.58	1.30	1.10	1.35	....
17	2.80	3.20	1.70	1.40	1.10	1.45	....
18	2.75	2.65	1.78	1.35	1.10	1.45	....
19	2.75	2.42	1.72	1.30	1.00	1.58	....
20	2.50	2.52	1.62	1.20	1.00	1.45	....

Daily gage height, in feet, of Laramie River at Woods Landing, Wyo., for 1911—Contd.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
21	2.40	2.92	1.50	1.30	1.00	1.30	....
22	2.30	2.68	1.42	1.38	1.00	1.65	....
23	2.32	2.48	1.32	1.70	1.00	1.85	....
24	2.52	2.15	1.38	1.52	1.68	1.45	....
25	2.65	2.35	1.32	1.32	1.55	1.40	....
26	2.78	2.00	1.32	1.35	1.25	1.42	....
27	2.60	1.90	1.65	1.35	1.10	1.42	....
28	2.58	1.85	1.65	1.30	1.30	1.45	....
29	2.68	1.80	1.65	1.22	1.24	1.48	....
30	2.65	1.75	1.65	1.12	1.32	1.42	....
31	2.75	....	1.55	1.10	....	1.40	....

Daily discharge, in second-feet, of Laramie River at Woods Landing, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1,080	200	165	30	170	36
2	....	1,090	236	140	28	220	26
3	....	1,080	410	110	32	170	25
4	....	1,060	410	100	40	115	24
5	....	1,180	375	100	45	80	70
6	....	1,170	410	135	35	80	110
7	410	1,260	410	100	23	200	70
8	550	1,340	375	70	23	70	53
9	710	1,410	810	60	18	110	42
10	670	1,090	269	45	18	85	29
11	335	1,090	139	65	18	42	35
12	385	943	175	80	18	45	....
13	495	943	200	65	18	40	....
14	620	960	292	55	18	40	....
15	780	943	215	45	23	40	....
16	810	1,090	215	60	23	30	....
17	905	1,480	280	80	23	45	....
18	865	1,000	328	70	23	45	....
19	865	811	292	60	18	62	....
20	660	892	236	45	18	45	....
21	580	1,230	175	60	18	32	....
22	555	1,030	139	80	18	78	....
23	570	859	98	180	17	152	....
24	730	595	95	100	110	45	....
25	835	755	75	55	70	40	M......
26	945	480	75	60	34	42	....
27	890	410	215	60	29	42	....
28	835	375	215	50	37	45	....
29	920	340	215	40	33	48	....
30	890	310	215	35	31	42	....
31	975	....	195	32	....	40	....

NOTE.—Daily discharge determined as follows: May 7 to June 5 and July 16 to Oct. 7, by indirect method for shifting channels; June 6 to July 15 and Oct. 8 to Nov. 11, from fairly well-defined rating curves.

Monthly discharge of Laramie River at Woods Landing, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 7-31	975	335	711	36,400	C.
June	1,480	310	943	56,100	C.
July	410	75	242	14,900	C.
August	180	32	77.5	4,770	C.
September	110	17	29.6	1,760	C.
October	220	32	75.7	4,650	C.
November 1-11	110	24	47.3	1,030	C.
The period				120,000	

LARAMIE RIVER AT TWO RIVERS, WYO.

Location.—At highway bridge at Two Rivers post office, in sec. 5, T. 17 N., R. 74 W. The nearest tributary is Little Laramie River which enters one-fourth mile below the station.

Records available.—May 6 to November 4, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Slightly shifting.

Discharge measurements.—Made from the bridge.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Laramie River of 460 second-feet between Woods Landing and Two Rivers.

Accuracy.—Results are only fair.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Laramie River at Two Rivers, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 6	Fletcher and Kingdon	2.10	95.0	June 25	R. H. Fletcher	3.50	439
June 5	R. H. Fletcher	3.60	488	Oct. 11	G. H. Russell	1.85	31.6
14	....do	3.40	451				

Daily gage height, in feet of Laramie River at Two Rivers, Wyo., for 1911.

[A. R. Peters, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		3.3	2.4	1.65	1.6	1.55	2.2
2		3.65	2.4	1.6	1.6	1.6	2.25
3		3.65	2.4	1.6	1.6	1.6	2.3
4		3.5	2.4	1.55	1.6	1.6	2.4
5		3.5	2.4	1.5	1.6	1.6	
6	2.1	3.6	2.3	1.5	1.6	1.6	
7		3.55	2.35	1.45	1.6	1.65	
8		3.65	2.4	1.4	1.6	1.7	
9		3.75	2.35	1.4	1.6	1.7	
10		4.0	2.3	1.3	1.6	1.75	
11		3.85	2.15	1.25	1.6	1.8	
12	2.25	3.6	2.1	1.3	1.6	1.8	
13	2.65	3.45	1.9	1.4	1.5	1.8	
14	3.05	3.3	1.8	1.4	1.5	1.8	
15	3.05	3.4	1.8	1.4	1.5	1.85	
16	3.25	3.5	1.8	1.4	1.5	1.8	
17	3.6	3.95	1.55	1.4	1.5	1.85	
18	3.8	4.4	1.9	1.3	1.4	1.8	
19	3.75	4.3	1.9	1.3	1.35	1.8	
20	3.85	3.7	1.75	1.5	1.3	1.8	
21	3.75	3.5	1.6	1.5	1.3	1.8	
22	3.5	3.75	1.6	1.55	1.2	1.8	
23	3.4	4.1	1.6	1.6	1.2	2.0	
24	3.2	3.75	1.5	1.6	1.2	2.05	
25	3.15	3.5	1.4	1.6	1.2	2.1	
26	3.0	3.25	1.7	1.6	1.25	2.1	
27	3.15	3.0	1.7	1.6	1.3	2.2	
28	3.2	2.85	1.7	1.6	1.4	2.1	
29	3.0	2.5	1.7	1.55	1.5	2.0	
30	3.1	2.4	1.7	1.55	1.5	2.0	
31	3.2		1.7	1.6		2.0	

NOTE.—Ice present Oct. 23 to Nov. 24.

Daily discharge, in second-feet, of Laramie River at Two Rivers, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	90	410	141	16	13	10	16	395	470	27	4	8	27
2	90	515	141	13	13	13	17	500	605	10	4	8	33
3	90	515	141	13	13	13	18	560	740	39	2	4	27
4	90	470	141	10	13	13	19	545	710	39	2	3	27
5	90	470	141	8	13	13	20	575	498	23	8	2	27
6	95	500	117	8	13	13	21	545	440	13	8	2	27
7	101	485	129	6	13	16	22	470	512	13	10	0	27
8	107	515	141	4	13	19	23	440	615	13	13	0	25
9	113	545	129	4	13	19	24	380	512	8	13	0	25
10	119	620	117	2	13	23	25	365	440	4	13	0	25
11	125	575	85	1	13	27	26	320	370	19	13	1	25
12	132	500	75	2	13	27	27	365	300	19	13	2	25
13	232	455	39	4	8	27	28	380	258	19	13	4	25
14	335	410	27	4	8	27	29	320	165	19	10	8	25
15	335	440	27	4	8	33	30	350	141	19	10	8	25
							31	380	....	19	13	....	25

NOTE.—Daily discharge determined as follows: May 6 to June 19 and June 20 to Oct. 22 from rating curves not well defined; discharge estimated May 1 to 5, May 7 to 11, and Oct. 23 to 31.

Monthly discharge of Laramie River at Two Rivers, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	575	90	291	17,900	C.
June	740	141	473	28,100	C.
July	141	4	61.1	3,760	C.
August	16	1	8.0	492	C.
September	13	0	7.7	458	C.
October	33	10	23.0	1,410	C.
The period				52,100	

LITTLE LARAMIE RIVER NEAR FILMORE, WYO.

Location.—At May's ranch, in sec. 9, T. 15 N., R. 77 W., 1½ miles south of Filmore post office; 4 miles below the junction of the North, Middle, and South Forks; 8 miles above the mouth of Mill Creek, the nearest tributary below.

Records available.—May 14 to October 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Slightly shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 450 second-feet from the Little Laramie, both above and below the station.

Accuracy.—The shifting channel makes the estimates of discharge only fair.

Cooperation.—Station maintained in cooperation with State engineer.

Discharge measurements of Little Laramie River near Filmore, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 6	R. H. Fletcher	3.10	620
15	.....do	2.80	424
25	.....do	2.30	285
Oct. 10	G. H. Russell	1.00	31.8

Daily gage height, in feet, and discharge, in second-feet, of Little Laramie River near Filmore, Wyo., for 1911.

[Ralph May, observer.]

Day.	May.		June.		July.		August.		September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	....	....	3.25	638	2.05	212	1.3	68	.08	12	1.2	55
2	....	....	3.3	660	2.05	212	1.25	62	.85	17	1.15	49
3	....	....	3.25	638	2.1	225	1.25	62	.85	17	1.1	43
4	....	....	3.4	705	2.05	205	1.2	55	.95	27	1.15	49
5	....	....	3.35	682	2.0	200	1.2	55	.9	22	1.35	75
6	....	....	3.45	728	2.0	200	1.15	49	.9	22	1.35	75
7	....	....	3.35	682	1.95	188	1.1	43	.9	22	1.2	55
8	....	....	3.9	930	1.95	188	1.05	38	.9	22	1.1	43
9	....	....	3.85	908	1.85	166	1.0	32	.9	22.	1.1	43
10	....	....	3.7	840	1.75	144	1.05	38	.9	22	1.1	43
11	....	....	3.5	750	1.6	114	1.15	49	.85	17	1.0	32
12	....	....	3.45	728	1.6	114	1.15	49	.85	17	1.0	32
13	....	....	3.2	615	1.6	114	1.15	49	.8	12	1.0	32
14	1.9	177	2.0	200	1.6	114	1.15	49	.8	12	1.0	32
15	2.15	240	2.05	212	1.6	114	1.05	38	.8	12	1.0	32
16	2.15	240	[a]3.5	750	1.6	114	1.05	38	.8	12	1.0	32
17	2.2	255	3.4	705	1.55	106	1.05	38	.8	12	1.1	43
18	2.3	285	3.0	535	1.5	97	1.0	32	.8	12	1.1	43
19	2.2	255	2.75	438	1.65	124	1.0	32	.8	12	1.0	32
20	2.1	225	2.75	438	1.6	114	1.0	32	.85	17	1.0	32
21	2.0	200	2.7	420	1.55	106	1.0	32	.9	22	1.0	32
22	2.0	200	2.65	402	1.5	97	1.0	32	.9	22	1.0	32
23	2.0	200	2.55	368	1.5	97	1.0	32	.9	22	1.0	32
24	2.15	240	2.55	368	1.4	82	1.0	32	.9	22	1.0	32
25	2.2	255	2.45	333	1.4	82	1.0	32	.9	22	1.0	32
26	2.5	350	2.4	315	1.4	82	1.0	32	.9	22	1.0	32
27	2.45	332	2.25	270	1.35	75	1.0	32	.9	22	1.0	32
28	2.5	350	2.05	212	1.35	75	.95	27	.9	22	.9	22
29	2.6	385	2.05	212	1.35	75	.95	27	.9	22	.9	22
30	2.7	420	2.05	212	1.3	68	.9	22	.95	27	.85	17
31	3.05	555	....	....	1.3	68	.8	12	....	....	.85	17

[a] The maximum gage height on June 16 was 4.2 feet.

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Little Laramie River near Filmore, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 14-31	555	177	287	10,200	C.
June	930	212	530	31,500	C.
July	225	68	128	7,870	C.
August	68	12	39.4	2,420	C.
September	27	12	18.8	1,120	C.
October	75	17	37.9	2,330	C.
The period	....	....	....	55,400	

LITTLE LARAMIE RIVER AT TWO RIVERS, WYO.

Location.—At highway bridge on section line between secs. 5 and 6, T. 17 N., R. 74 W., half a mile south of Two Rivers post office; nearest tributary, Mill Creek, enters about 12 miles above; no tributary between the station and the mouth, one-half mile below.

Records available.—May 6 to November 4, 1911.

Drainage area.—421 square miles (measured from Hayden's Atlas).

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made from bridge during high water, and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Little Laramie River of 450 second-feet, and from the tributaries, 326 second-feet. These diversions are all above the station.

Accuracy.—As the station has not been completely rated no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with State engineer.

Discharge measurements of Little Laramie River at Two Rivers, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 6	Fletcher and Kingdon	1.90	5.5
June 5	R. H. Fletcher	3.05	188
14	.....do	2.80	101
25	.....do	2.80	128
Oct. 11	G. H. Russell	1.25	[a] 0

[a] Water standing in pools.

Daily gage height, in feet, of Little Laramie River at Two Rivers, Wyo., for 1911.

[A. R. Peters, observer.]

Day.	May.	June.	July.	Oct.	Nov.	Day.	May.	June.	July.	Oct.	Nov.
1	......	2.25	2.2	......	2.15	16	1.0	2.8	1.8	1.4	......
2	......	2.55	2.3	......	2.2	17	1.7	3.7	1.75	1.55	......
3	......	2.7	2.3	......	2.2	18	1.7	4.15	1.7	1.65	......
4	......	2.7	2.3	......	2.2	19	1.7	3.25	1.8	1.8	......
5	......	3.0	2.2	......	......	20	1.9	2.75	1.75	1.85	......
6	1.9	3.15	2.1	......	......	21	1.65	2.7	1.6	1.8	......
7	......	3.2	2.1	......	......	22	......	3.35	1.6	1.8	......
8	......	3.15	2.0	......	......	23	......	3.5	1.7	1.85	......
9	......	3.6	2.0	......	......	24	......	3.0	1.7	1.9	......
10	......	3.7	2.0	......	......	25	......	2.75	1.6	1.95	......
11	......	3.4	2.0	......	......	26	......	2.7	1.6	2.05	......
12	1.9	3.05	1.9	......	......	27	......	2.55	......	2.1	......
13	1.06	2.9	1.8	......	......	28	......	2.5	......	2.1	......
14	1.5	2.8	1.8	......	......	29	......	2.3	......	2.0	......
15	1.45	2.7	1.8	......	......	30	1.9	2.2	......	2.05	......
						31	1.9	......	......	2.1	......

NOTE.—On days for which gage heights are omitted from May 1 to Nov. 4 the water stood in pools.

NORTH LARAMIE RIVER AT UVA, WYO.

Location.—At highway bridge in sec. 20, T. 25 N., R. 67 W., one-fourth mile west of Uva; 800 feet above the mouth.

Records available.—May 21 to November 10, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—It is probable that the station is within the influence of backwater from Laramie River during high water. This is the only section on the lower river where an observer can be obtained.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from North Laramie of 59 second-feet, and from the tributaries, 70 second-feet. These diversions are all above the station.

Accuracy.—The station has not been completely rated, and no estimates of flow have been made.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of North Laramie River at Uva, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 22	R. H. Fletcher	0.55	6.2
June 22	E. O. Christiansen	.69	6.0
July 2	R. H. Fletcher	.52	1.4
21	do	.44	.8
Oct. 19	G. H. Russell	.62	[a]2.0

[a] Discharge estimated.

Daily gage height, in feet, of North Laramie River at Uva, Wyo., for 1911.

[W. H. Ralston, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		0.50	0.50	0.40	0.48	0.50	0.65	16		[a]3.40	0.55	0.50	0.45	0.45	
2		.50	.50	.40	.50	.50	.65	17		1.10	.58	.50	.45	.45	
3		.48	.50	.40	.50	.50	.65	18		1.15	.55	.45	.45	.45	
4		.45	.50	.40	.50	.50	.70	19		.95	.55	.40	.50	[c].65	
5		.45	.50	.40	.50	.48	.70	20		.82	.55	.40	.48	.65	
6		.38	.52	.40	.50	.45	.70	21	0.60	.72	.48	.40	.40	.65	
7		.28	.55	.40	.45	.45	.70	22	.58	.70	.48	.40	.40	.65	
8		.25	.55	.40	.45	.45	.70	23	.52	.68	.48	.40	.40	.65	
9		.20	.55	.40	.45	.45	.70	24	.50	.68	.50	.40	.40	.65	
10		.20	.52	.40	.45	.45	.70	25	.50	.60	.45	.40	.40	.65	
11		.20	.48	.40	.45	.45		26	.50	.60	.40	.40	.40	.65	
12		.20	.45	.48	.45	45		27	.50	.60	.40	.40	.45	.65	
13		.20	.45	.50	.45	.45		28	.50	.58	.40	.45	.48	.65	
14		.20	(b)	.48	.45	.45		29	.50	.57	.40	.48	.45	.65	
15		.20		.50	.45	.45		30	.50	.52	.40	.45	.48	.65	
								31	.50		.40	.45		.65	

[a] Maximum, 6.0 feet.
[b] Backwater from Laramie River; flow above this influence practically unchanged.
[c] Increase due to closing of canal above.

CHUGWATER CREEK AT CHUGWATER, WYO.

Location.—At highway bridge in sec. 31, T. 21 N., R. 66 W., one-half mile from Chugwater. No important tributaries within several miles of the station.

Records available.—May 22 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Reasonably permanent control for the station is formed by a low diversion dam about 300 feet below the gage.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Chugwater Creek of 178 second-feet and from the tributaries 72 second-feet.

Accuracy.—As the station has not been completely rated, no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the State engineer and with the Swan Land & Cattle Co.

Discharge measurements of Chugwater Creek at Chugwater, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 23	Fletcher and Johnston	0.62	3.8
Do.	do.	.63	3.4
July 3	R. H. Fletcher	.55	[a] 1.5
22	Fletcher and Johnston	.80	9.7
Oct. 12	G. H. Russell	.62	2.9

[a] Estimated.

Daily gage height, in feet, of Chugwater Creek at Chugwater, Wyo., for 1911.

[A. A. Woolwer, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.60	0.54	0.60	0.62	0.68	0.72	0.68
2		.59	.55	.60	.62	.68	.75	.68
3		.58	.55	.60	.62	.68	.75	.69
4		.58		.60	.62	.62	.75	.70
5		.58	.54	.60	.62	.66	.74	.70
6		.58	.54	.60	.62	.66	.78	.70
7		.57	.54	.60	.64	.65	.79	.70
8		.57	.54	.60	.64	.60	.90	.70
9		.57	.54	.60	.65	.60	.85	.70
10		.57	.54	.60	.61	.60	.78	.70
11		.57	.55	.60	.60	.60	.75	.70
12		.58	.55	.60	.60	.62	.72	.70
13		.58	.56	.60	.60	.62	.70	.69
14		.58	[a] 2.00	.61	.60	.62	.66	.68
15		.57	.84	.60	.60	.69	.82	.67
16		1.15	.68	.60	.60	.70	.90	.66
17		.60	.66	.60	.60	(c)		.64
18		.58	.64	.60	.60			.66
19		.58	.62	1.50	.60			.65
20		.56	.61	.78	.60			.64
21		.58	.60	.71	.60		.85	.66
22	0.65	.58	[b] 1.45	.70	.60	.70	.86	.65
23	.64	.56	.69	.70	.60	.72	.75	.65
24	.64	.56	.62	.72	.60	.70	.70	.64
25	.63	.56	.60	.70	.60	.70	.74	.64
26	.62	.56	.60	.70	.60	.71	.78	.64
27	.66	.55	.60	.68	.60	.70	.70	.63
28	.62	.54	.60	.66	.60	.72	.70	.64
29	.60	.54	.60	.64	.60	.72	.69	.64
30	.60	.54	.60	.62	.60	.72	.65	.64
31	.60		.60	.62		.72		.65

[a] Maximum 2.4. [b] Maximum 2.8. [c] Temporary backwater.

HORSE CREEK NEAR LITTLE HORSE CREEK, WYO.

Location.—At upper Coad ranch, in sec. 10, T. 18 N., R. 62 W., 1 mile from Little Horsecreek post office; 1 mile above mouth of Little Horse Creek, the nearest tributary.

Records available.—December 1 to 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Horse Creek of 1,216 second-feet, nearly all below the station.

Accuracy.—No estimates of discharge have been made, as base data are insufficient.

Cooperation.—Station maintained in cooperation with State engineer and Mr. J. A. Whiting.

The following discharge measurement was made by Watson and Whiting:

December 1, 1911: Gage height, 1.60 feet; discharge, 12 second-feet.

Daily gage height, in feet, of Horse Creek near Little Horse Creek, Wyo., for 1911.

Day.	Dec.	Day.	Dec.	Day.	Dec.
1	1.60	6	1.75	11	1.60
2	....	7	1.60	12	1.60
3	1.62	8	1.60	13	1.70
4	1.60	9	1.60	14	1.60
5	1.60	10	1.60	15	1.80
				16	1.80

HORSE CREEK NEAR LAGRANGE, WYO.

Location.—At Wye Cross ranch, about sec. 28, T. 20 N., R. 61 W., 3 miles above Lagrange, Wyo., 1 mile below mouth of Bear Creek.

Records available.—December 1 to 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Horse Creek of 1,216 second-feet and of 224 second-feet from tributaries entering above the station.

Accuracy.—Data insufficient for estimates of daily and monthly discharge.

Cooperation.—Station maintained in cooperation with State engineer.

The following discharge measurement was made by Watson and Whiting:

December 1, 1911: Gage height, .40 feet; discharge, 2.2 second-feet.

Daily gage height, in feet, of Horse Creek near Lagrange, Wyo., for 1911.

Day.	Dec.	Day.	Dec.	Day.	Dec.
1	.04	11	0.8	21	3.1
2	.4	12	.8	22	2.2
3	.5	13	.8	23	3.1
4	.6	14	.8	24	3.1
5	.5	15	.8	25	3.1
6	.6	16	.8	26	3.1
7	.6	17	.8	27	3.1
8	.8	18	.8	28	3.3
9	.8	19	1.2	29	3.7
10	.8	20	1.1	30	3.7
				31	3.7

NOTE.—Ice present during the greater part of December.

MIDDLE FORK[1] OF SOUTH PLATTE RIVER AT FAIRPLAY, COLO.

Location.—At the highway bridge at Fairplay, in sec. 33, T. 9 S., R. 77 W., 1 mile above the mouth of Beaver Creek and about 3 miles below the mouth of Sacramento Creek.

Records available.—October 17, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no court decrees for diversions from Middle Fork above the station, but decrees for diversions of 1,092 second-feet below. There are also decrees for diversions of 147 second-feet from tributaries entering above.

Accuracy.—As the station has not been completely rated no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Middle Fork of South Platte River at Fairplay, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 1	O. M. Wimmer	.75	8.8
Apr. 24	.....do	1.03	20.5
Sept. 16	.....do	1.30	28.2

Daily gage height, in feet, of Middle Fork of South Platte River at Fairplay, Colo., for 1911.

[E. N. Brown, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.50	0.70	0.75	0.79	1.00	1.85	1.75	1.5	1.25	1.2	1.3	1.1
2	.50	[a]1.60	.75	.82	1.02	1.9	2.2	1.45	1.3	1.25	1.15	1.15
3	.50	.70	.62	1.00	1.05	1.9	2.3	......	1.35	1.2	1.35	1.1
4	.40	[a]1.60	.67	.92	1.25	1.95	......	......	1.3	......	1.2	1.1
5	.40	......	......	.83	......	2.05	2.6	1.5	......	......	1.2	1.2
6	.40	1.80	.68	.79	1.4	2.05	2.65	1.45	1.25	......	......	1.1
7	.40	1.70	.70	.72	1.4	2.1	2.6	1.45	1.2	1.15	......	......
8	.40	1.90	.64	.73	1.5	2.2	2.25	1.4	1.2	1.2	1.1	1.0
9	.50	1.90	.68	.83	1.5	......	2.2	1.5	1.2	1.15	1.2	1.05
10	.60	[a]1.90	......	.75	1.45	2.0	2.3	1.5	1.25	......	......	1.0
11	.70	......	.72	.73	1.4	2.25	......	1.4	......	......	......	1.0
12	.70	......	......	......	1.35	2.4	......	1.4	......	1.25	1.2	1.05
13	.70	......	.70	.71	1.4	2.15	......	1.5	1.2	1.25	1.25	1.0
14	.70	.70	.75	.70	1.4	2.1	......	1.4	......	1.3	......	......
15	......	.70	.78	.72	1.5	2.2	......	......	1.25	1.25	......	......
16	.70	.70	.75	.73	1.5	2.1	......	......	1.25	1.2	1.1	1.0
17	......	.70	.75	.73	1.6	2.2	1.8	......	1.2	1.3	......	......
18	.60	......	.70	1.00	......	2.0	1.7	1.55	......	1.35	1.25	1.0
19	......	......	......	1.02	1.5	2.2	1.75	1.55	1.25	1.2	......	1.05
20	.70	.70	.73	1.02	1.45	2.2	......	1.5	1.15	1.3	1.3	1.05
21	.70	.60	.70	1.03	1.4	2.3	1.7	1.5	1.3	1.25	1.2	1.0
22	......	.60	.75	1.30	1.35	2.3	1.65	1.6	......	1.3	......	......
23	[a]1.60	.50	.76	......	1.35	2.4	1.6	......	1.25	1.25	1.15	1.0
24	.70	.50	.75	1.03	......	2.3	......	......	......	1.3	......	......
25	.70	.60	.80	1.08	......	2.1	......	1.3	1.15	1.4	......	......
26	......	......	......	1.08	......	1.8	......	1.3	1.2	1.3	......	......
27	.70	.70	.78	1.25	1.5	1.75	1.5	1.25	1.2	1.2	......	......
28	.70	.70	.65	1.13	1.55	1.8	1.5	......	......	1.4	1.2	......
29	......	......	.71	1.30	1.6	1.75	1.5	......	......	1.15	1.15	......
30	.70	......	.70	1.05	1.75	1.6	1.55	......	1.35	1.3	1.25	.95
31	......	......	.72	......	1.85	......	......	......	......	1.35	......	.95

[a] Ice gorge.

NOTE.—Ice caused backwater Nov. 20 to Dec. 31, and it is probable that gage heights were affected by ice during January, February, and March; approximate thickness of ice during December, 0.3 foot.

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[1] Erroneously called the South Fork in 1910 report.

SOUTH FORK OF SOUTH PLATTE RIVER AT LAKE GEORGE, COLO.

Location.—At highway bridge in sec. 19, T. 12 S., R. 71 W., one-fourth mile below Lake George, in the Pike National Forest, about 2 miles above the mouth of Caylor Gulch; no tributary between the outlet of the lake and the station.

Records available.—October 22, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Automatic recording gage installed in 1911, reading to the same datum as the original staff gage.

Channel.—Conditions in the channel will remain unchanged as long as the control for the station—a 2-foot timber-crib dam 50 feet below the gage—remains permanent.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Artificial control.—The discharge at the station is controlled naturally to some extent by the regulating effect of Lake George, which has an area of one-half square mile.

Diversions.—There are court decrees for diversions of 1,076 second-feet from the South Fork above this station and for diversions of 1,816 second-feet from tributaries entering above.

Accuracy.—As the station has not been completely rated, no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with United States Forest Service and the State engineer of Colorado.

Discharge measurements of South Fork of South Platte River at Lake George, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 11[a]	Russell and Wimmer	0.74	1.6
Apr. 26	O. M. Wimmer	1.20	12.9
July 8	E. O. Christiansen	3.32	729
Sept. 25	H. B. Waha	1.78	41.9

[a] Ice conditions.

Daily gage height, in feet, of South Fork of South Platte River at Lake George, Colo., for 1911.

[F. C. Parrett, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.70		0.85	2.0	0.95	1.05	2.2	2.3	2.0	1.7	1.55	1.3
2			1.0	2.0	1.05	1.05	2.45	2.3	2.0	1.7	1.55	1.25
3			1.0	1.9	1.05	1.05	3.5	2.2	2.0	1.5	1.6	1.05
4			.9	2.0	1.05	1.0	3.4	2.2	1.95	1.3	1.65	1.05
5			1.1	1.85	1.15	.95	3.5	2.15	1.9	1.45	1.65	1.15
6	.6		1.0	1.7	1.15	1.0	3.3	2.1	1.90	1.8	1.65	1.15
7			1.1	1.55	1.05	1.5	3.25	2.05	1.85	2.0	1.6	1.15
8	.7		1.2	1.35	1.2	1.75	3.35	2.0	1.85	1.95	1.6	1.1
9	.68		1.35	1.35	1.2	1.95	3.1	2.0	1.85	1.65	1.6	1.15
10	.72		1.7	1.25	1.1	1.9	2.8	2.0	1.8	1.6	1.6	1.05
11	.74		1.75	1.4	1.05	1.85	2.1	2.05	1.8	1.7	1.35	.95
12			1.25	1.4	1.05	1.8	2.2	2.15	1.8	1.45	1.45	.95
13			1.35	1.15	1.05	1.85	2.1	2.1	1.75	1.15	1.45	1.0
14			1.55	1.05	1.0	2.15	2.35	2.05	1.75	1.6	1.4	
15			1.6	1.1	1.15	2.3	2.3	2.05	1.85	1.6	1.5	1.0

Daily gage height, in feet, of South Fork of South Platte River at Lake George, Colo., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16			1.65	1.05	1.3	2.4	2.4	2.0	1.9	1.55	1.5	.90
17		1.06	1.6	1.2	1.4	2.45	2.15	2.05	1.9	1.55	1.4	
18	.8	1.0	1.65	1.2	1.45	2.45	2.05	2.1	1.8	1.5	1.4	.90
19		1.05	1.5	1.2	1.45	2.7	2.15	2.05	1.7	1.5	1.3	
20		.95	1.6	1.1	1.35	2.75	2.2	2.0	1.7	1.45	1.3	1.00
21		.8	1.7	1.2	1.45	2.75	2.45	2.05	1.75	1.4	1.4	
22		.8	1.6	1.2	1.50	2.75	2.5	2.1	1.8	1.4	1.5	
23		.8	1.65	1.1	1.5	2.85	2.55	2.25	1.8	1.6	1.6	
24		1.0	1.8	1.2	1.4	2.7	2.6	2.35	2.0	1.9	1.55	
25		1.0	1.96	1.25	1.4	2.4	2.65	2.3	2.15	1.9	1.55	
26		.85	1.6	1.3	1.4	2.3	2.7	2.05	1.7	1.65	1.6	
27		.75	1.6	1.25	1.35	2.2	2.6	2.05	1.7	1.65	1.45	
28		.8	1.65	1.2	1.2	2.25	2.45	2.05	1.7	1.65	1.35	
29			1.95	1.15	1.2	2.25	2.3	2.05	1.7	1.4	1.4	
30			1.7	1.05	1.05	2.2	2.35	2.0	1.7	1.25	1.3	
31			1.45		1.1		2.3	2.0		1.5		

NOTE.—Ice present Jan. 1 to Feb. 16 and Dec. 3 to 31.

SOUTH FORK OF SOUTH PLATTE RIVER AT SOUTH PLATTE, COLO.

Location.—In sec. 25, T. 7 S., R. 70 W., in the Pike National Forest, half a mile east of South Platte, 600 feet above junction with the North Fork.

Records available.—May 8, 1905, to December 31, 1911.

Drainage area.—2,160 square miles.

Gage.—Inclined staff; datum unchanged.

Channel.—Somewhat shifting.

Discharge measurements.—Made from car and cable during highwater and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Artificial control.—The flow is controlled to a certain extent by the Cheeseman reservoir, 20 miles upstream, which has a capacity of 79,000 acre-feet. No very important tributaries enter between the reservoir and this station.

Diversions.—There are no court decrees for diversions from the South Fork between this station and the one at Lake George; but decrees for diversion of 1,400 second-feet from intervening tributaries.

Accuracy.—Although the channel is somewhat shifting, sufficient discharge measurements have been made to enable reliable estimates of discharge to be made.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of South Fork of South Platte River at South Platte, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 10[a]	R. H. Fletcher	1.98	75.6	July 11	G. H. Russell	3.95	944
Feb. 22[a]	do	1.90	77.3	Aug. 18	R. H. Fletcher	2.35	200
Mar. 16	do	1.50	46.7	29	do	2.55	237
May 10	Miles and Turner	1.87	71.9	Sept. 8	Waha and Fletcher	2.40	196
23	R. C. Miles	2.80	344	Nov. 4	G. H. Russell	1.92	71.6
June 12	J. B. Stewart	2.00	93.9	Dec. 16[b]	R. H. Fletcher	1.80	73.4

[a] Ice conditions.

[b] Slight ice effect.

Daily gage height, in feet, of South Fork of South Platte River at South Platte, Colo., for 1910-11.

[Miss A. Vermillion, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	2.25	2.2	2.0	2.6	3.1	2.7	2.45	2.25	2.05	2.0	1.9	1.7
2	2.3	2.15	2.1	2.6	3.1	2.7	2.7	3.15	2.05	2.0	1.85	1.7
3	2.2	2.1	2.2	2.65	3.1	2.7	2.9	3.4	2.0	2.0	1.8	1.7
4	2.2	2.0	2.2	2.6	3.2	2.7	2.8	3.3	2.0	1.95	1.85	1.7
5	2.2	2.0	2.5	2.6	3.25	2.7	2.8	3.1	2.0	1.9	1.95	1.6
6	2.4	2.0	2.7	2.6	3.05	2.7	2.8	3.05	1.9	1.9	2.0	1.65
7	2.5	1.9	2.7	2.0	3.0	2.95	2.8	3.0	1.85	1.9	2.0	1.7
8	2.5	1.7	2.7	2.0	2.9	2.85	2.8	2.9	1.85	1.9	2.0	1.7
9	2.6	1.7	2.75	2.0	2.8	2.8	2.35	2.85	1.95	1.95	2.05	1.75
10	2.6	1.7	3.6	2.6	2.8	2.75	1.9	3.3	1.85	1.95	2.1	1.7
11	2 3	1.75	3.55	2.65	2.8	2.8	1.9	3.3	1.9	1.95	2.1	1.7
12	2.3	1.65	3.4	2.65	2.9	2.7	1.9	3.3	1.9	1.95	2.05	1.7
13	2.3	1.7	3.3	2.7	2.9	2.75	1.9	3.4	1.9	1.9	2.0	1.65
14	2.25	1.75	3.2	2.85	2.8	2.65	1.9	3.25	1.9	1.95	2.05	1.65
15	2.3	1.9	3.2	2.8	3.0	2.75	1.9	2.35	1.9	1.95	2.05	1.65
16	2.3	1.9	3.1	2.6	2.95	2.8	1.9	2.0	1.9	1.95	2.05	1.65
17	2.4	1.95	3.15	2.65	3.05	2.8	2.0	2.55	2.0	2.0	2.0	1.65
18	2.4	1.95	3.2	2.65	3.25	2.9	2.05	2.55	1.95	2.0	2.0	1.8
19	2.5	2.0	3.2	2.65	3.15	2.9	2.0	2.55	1.9	2.0	1.95	1.8
20	2.45	2.1	3.2	2.7	2.95	2.7	2.1	2.3	1.9	2.0	1.9	1.7
21	2.5	2.25	3.2	2.8	2.95	2.5	2.1	2.5	2.05	2.0	1.9	1.8
22	2.5	2.2	3.2	2.85	3.0	2.6	2.15	2.55	2.1	2.15	1.8	1.9
23	2.45	2.2	2.9	2.85	3.1	2.6	2.1	2.55	2.25	2.15	1.85	1.85
24	2.3	2.1	2.9	2.85	3.2	2.6	2.1	2.55	2.15	2.15	1.8	1.85
25	2.25	2.0	2.9	2.9	3.2	2.2	2.75	2.0	2.15	2.15	1.75	1.9
26	2.15	2.0	2.8	2.9	3.1	2.2	2.75	2.05	2.15	2.15	1.85	1.9
27	2.2	2.0	2.8	2.9	2.9	2.1	2.75	2.1	2.15	2.1	1.85	1.9
28	2.2	2.0	2.7	2.9	3.0	2.15	2.8	2.05	2.15	2.1	1.7	2.1
29	2.15	......	2.7	3.0	2.85	2.2	3.6	2.05	2.15	2.1	1.8	2.0
30	2.2	......	2.6	3.0	2.7	2.2	2.8	2.0	2.15	2.1	1.8	2.0
31	2.2	......	2.6	......	2.7	......	2.75	2.1	......	2.1	......	2.05
1911.												
1	2.0	1.7	1.85	1.5	2.2	2.05	3.0	2.5	2.6	2.1	1.8	2.0
2	1.85	1.6	1.65	2.0	2.1	2.05	3.0	2.25	2.7	2.1	1.9	2.0
3	1.9	1.6	1.75	2.5	2.05	2.25	3.1	2.25	2.7	2.1	1.9	2.0
4	1.9	1.7	1.8	2.7	2.0	2.25	3.0	2.25	2.6	2.4	1.9	2.1
5	2.0	1.8	1.75	2.75	1.95	2.1	3.0	3.0	2.6	2.4	1.9	2.0
6	1.9	1.65	1.75	2.75	1.9	2.0	2.75	3.1	2.5	2.4	1.85	2.0
7	1.9	1.8	1.7	2.65	1.9	1.95	3.25	3.05	2.5	2.1	1.85	2.0
8	2.0	1.7	1.75	2.5	1.9	1.95	4.1	2.3	2.4	2.0	1.85	2.0
9	1.8	1.75	1.7	2.3	1.9	1.95	4.1	2.3	2.4	2.0	1.9	1.7
10	2.1	1.7	1.75	2.15	1.85	1.95	4.1	3.0	2.4	1.8	1.9	1.6
11	2.05	1.7	1.7	2.1	1.85	1.95	4.05	2.6	2.3	1.8	1.9	1.5
12	2.0	1.75	1.65	2.1	1.9	1.95	4.0	2.4	2.3	1.75	2.0	2.0
13	1.9	1.75	1.5	2.05	1.8	1.95	4.0	2.4	2.25	1.7	1.8	2.1
14	1.8	1.75	1.45	2.05	1.85	1.95	4.0	2.4	2.2	1.7	1.8	1.8
15	1.9	1.75	1.5	2.0	1.85	2.1	4.0	2.35	2.1	1.7	1.8	1.8
16	2.0	1.8	1.55	2.0	1.9	2.3	4.0	2.3	2.1	1.7	1.8	1.8
17	1.85	1.8	1.5	2.0	1.85	2.3	4.0	2.3	2.15	1.7	1.8	1.8
18	1.65	1.8	1.45	1.95	1.9	2.3	2.4	2.4	2.1	1.7	1.8	1.85
19	1.7	1.65	1.5	1.95	1.9	2.3	2.25	2.4	2.1	1.7	1.8	1.95
20	1.75	1.35	1.5	1.9	2.1	2.3	3.3	2.4	2.1	1.7	1.8	1.85
21	2.0	1.65	1.55	1.8	2.7	2.7	3.3	2.3	2.1	1.7	1.8	1.75
22	1.8	2.1	1.6	1.95	2.75	2.7	3.3	2.3	2.1	1.7	1.8	1.8
23	1.8	2.05	1.5	2.0	2.75	2.5	3.6	3.2	2.1	1.7	1.75	2.1
24	2.05	2.1	1.55	1.85	2.75	2.5	3.6	3.2	2.1	1.7	1.75	2.0
25	2.0	2.1	1.5	1.9	2.75	2.7	3.6	3.2	2.1	1.7	2.0	1.9
26	1.95	2.0	1.5	1.85	2.75	2.7	3.5	3.2	2.1	1.7	2.0	1.8
27	1.9	1.85	1.4	1.7	2.75	2.8	3.2	2.6	2.1	1.7	1.8	1.7
28	1.9	1.9	1.55	1.75	2.45	2.8	3.0	2.6	2.1	1.7	1.6	3.7
29	1.85	......	1.5	1.9	2.15	2.9	3.0	2.6	2.1	1.7	1.8	4.0
30	1.85	......	1.5	2.4	2.1	3.0	2.8	2.6	2.1	1.7	2.0	2.7
31	1.7	......	1.45	......	2.1	......	2.75	2.6	......	1.8	......	2.6

NOTE.—Ice present Jan. 1 to 10 and Dec. 18 to 31, 1910; gage heights for 1910, published in Water Supply Paper No. 286, were partly in error as necessary corrections were not applied; corrected gage heights given in above table. Ice present Jan. 1 to Feb. 26, and Nov. 26 to Dec. 31, 1911.

Daily discharge, in second-feet, of South Fork of South Platte River at South Platte, Colo., for 1910–11.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	110	122	94	242	425	317	200	170	125	114	95	54
2	110	113	114	242	430	318	274	455	125	114	88	54
3	110	104	136	258	434	319	342	580	114	114	80	54
4	115	88	136	242	476	320	308	530	114	114	86	54
5	115	88	214	242	503	318	308	435	114	96	110	46
6	120	88	274	242	420	315	308	410	96	96	109	50
7	120	75	242	94	406	408	308	382	88	96	108	54
8	125	53	274	94	370	362	308	340	88	96	106	54
9	130	53	291	94	335	335	173	315	105	105	117	59
10	135	53	644	242	337	317	78	564	88	105	127	54
11	142	58	620	258	339	330	78	564	96	105	125	54
12	142	49	550	258	380	295	78	564	96	105	115	54
13	142	53	506	274	380	305	78	610	96	105	103	50
14	132	58	462	325	340	270	78	541	96	105	112	50
15	142	78	462	308	425	300	78	173	96	105	110	50
16	142	78	420	242	403	315	78	114	96	105	110	50
17	162	86	441	258	445	312	94	246	114	114	100	50
18	162	86	462	258	540	343	104	246	105	114	98	45
19	184	94	462	258	490	340	94	246	96	114	90	45
20	173	114	462	274	408	274	114	182	96	114	82	45
21	184	148	462	308	410	214	114	240	125	114	80	45
22	184	136	462	325	430	242	125	256	136	147	70	45
23	173	136	342	325	476	242	114	256	170	147	70	45
24	142	114	342	325	520	242	114	256	147	147	64	45
25	132	94	342	342	522	136	292	136	147	147	59	45
26	113	94	308	342	480	136	308	125	147	147	70	55
27	122	94	308	342	395	114	322	136	147	136	70	55
28	122	94	274	338	435	125	362	125	147	136	54	55
29	113	......	274	378	375	136	550	125	147	136	64	55
30	122	......	242	380	314	136	350	114	147	136	64	55
31	122	......	242	......	316	......	322	136	......	136	......	55
1911.												
1	65	55	72	46	142	105	432	242	254	106	58	85
2	65	50	53	94	116	105	432	165	290	106	70	85
3	65	50	61	233	106	156	480	165	290	106	70	85
4	65	55	66	302	94	156	432	165	254	188	70	85
5	70	65	61	323	86	116	432	448	254	188	70	85
6	70	55	61	323	78	94	323	500	220	188	64	85
7	70	65	56	284	78	86	555	472	220	106	64	85
8	70	55	61	233	78	86	1,040	170	188	86	64	85
9	75	60	56	170	78	86	1,040	170	188	86	70	75
10	75	55	61	129	72	86	1,040	442	188	58	70	75
11	75	55	56	116	72	86	1,010	283	158	58	70	75
12	75	60	53	116	78	86	975	215	158	53	86	75
13	70	60	46	105	66	86	975	215	144	48	58	75
14	70	60	44	105	72	86	975	215	130	48	58	75
15	70	60	46	94	72	116	975	200	106	48	58	75
16	75	65	48	94	78	170	975	182	106	48	58	75
17	70	65	46	94	72	170	975	182	118	48	58	75
18	55	65	44	86	78	170	200	200	106	48	58	75
19	55	55	46	86	78	170	130	198	106	48	58	80
20	60	60	46	78	116	170	585	198	106	48	58	80
21	65	70	48	66	302	302	585	175	106	48	58	80
22	65	77	50	86	323	302	585	175	106	48	58	80
23	65	77	46	94	323	233	750	540	106	48	53	80
24	65	85	48	72	323	233	750	540	106	48	53	90
25	75	90	46	78	323	302	755	540	106	48	53	90
26	85	94	46	72	323	302	700	540	106	48	58	90
27	75	72	42	56	323	344	545	260	106	48	58	90
28	75	78	48	61	216	344	445	260	106	48	42	100
29	70	......	46	78	129	386	445	260	106	48	58	100
30	70	......	46	200	116	432	355	254	106	48	86	100
31	55	......	44	......	116	......	335	254	......	58	......	100

NOTE.—Daily discharge for 1910, published in Water Supply Paper No. 286, erroneous because of noncorrection of gage heights and method of computing; revised determination presented here. Discharge estimated Jan. 1 to 10 and Dec. 18 to 31, 1910, on account of presence of ice. Daily discharge determined Jan. 11 to 31, Feb. 15 to Apr. 27, May 10 to June 4, June 21 to July 24, Aug. 12 to Oct. 31, and Nov. 23 to Dec. 17, 1910, from fairly well-defined curves; indirect method for shifting channels used for the remaining periods of 1910. Daily discharge Jan. 1 to Feb. 26 and Nov. 26 to 31, 1911, estimated because of ice; daily discharge Feb. 27 to July 11 and Aug. 30 to Nov. 25, 1911, determined from two curves well-defined bewteen 50 and 450 second-feet; indirect method for shifting channels used from July 12 to Aug. 29, 1911.

Monthly discharge of South Fork of South Platte River at South Platte, Colo., for 1910–11.

[Drainage area, 2,160 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1910.					
January	184	110	137	8,410	B.
February	148	49	89.3	4,960	B.
March	644	94	350	21,500	B.
April	380	94	270	16,100	B.
May	540	314	418	25,700	B.
June	408	114	271	16,100	B.
July	550	78	208	12,800	B.
August	610	114	310	19,000	B.
September	170	88	117	6,950	B.
October	147	96	118	7,270	B.
November	127	54	91.2	5,430	B.
December	59	45	50	3,060	B.
The year	644	45	204	147,000	
1911.					
January	85	55	70.6	4,340	B.
February	94	50	64.8	3,600	B.
March	72	42	51.4	3,160	B.
April	323	46	132	7,880	A.
May	323	66	146	8,980	A.
June	432	86	186	11,000	A.
July	1,040	130	653	40,100	A.
August	540	165	285	17,500	A.
September	290	106	155	9,210	A.
October	188	48	72.6	4,460	A.
November	86	42	62.2	3,700	B.
December	100	75	83.6	5,140	B.
The year	1,040	42	165	119,000	

NOTE.—Monthly estimates for this station for 1910, as published in Water Supply Paper 286, are in error, and the revised values are published herewith.

SOUTH PLATTE RIVER AT SOUTH PLATTE, COLO.

Location.—In sec. 25, T. 7 S., R. 70 W., in the Pike National Forest, three-fourths of a mile east of South Platte; about 300 feet below junction of the North and South forks; no tributary between the forks and the station, and none for several miles below.

Records available.—March 28, 1902, to December 31, 1911. Records at Platte Canyon and at Deansbury, a few miles below, extend back to 1887 with the exception of the years 1893 and 1894. The earlier records, 1887–1892, were taken by the State engineer, and the records from 1895 to 1898 were taken under the direction of the Denver Power & Irrigation Co.

Drainage area.—2,610 square miles.

Gage.—An automatic recording gage, installed by the State engineer March 14, 1910. From March 28, 1902, to May 7, 1905, the gage was at the highway bridge. On the latter date it was moved to its present site, 150 feet below. It is probable that the new gage read to a somewhat different datum. The recording gage is referred to the datum of the gage established in 1905.

Channel.—Shifting.

Discharge measurements.—Made from car and cable during high water, and by wading at low stages.

Winter flow.—Ice causes backwater during a portion of the winter months and measurements are made to determine the flow.

Artificial control.—The flow is controlled to a certain extent by the Cheesman reservoir which is on the South Fork about 20 miles above the forks.

Diversions.—No water is diverted between this station and that on the South Fork at South Platte nor between this station and that on the North Fork at Cassells.

Accuracy.—Although the channel is shifting, sufficient discharge measurements have been obtained to enable fair estimates of discharge to be made.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of South Platte River at South Platte, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 10[a]	R. H. Fletcher	2.08	111	July 11	G. H. Russell	4.28	1,190
Feb. 22[a]	do	1.88	106	Aug. 18	R. H. Fletcher	2.37	308
Mar. 15	do	1.48	72.2	29	do	2.00	324
16	do	1.60	98.0	Sept. 8	Fletcher and Waha	2.04	284
May 10	Turner and Miles	2.58	361	Nov. 8	G. H. Russell	1.65	94.1
June 12	J. B. Stewart	2.75	445	Dec. 16[a]	R. H. Fletcher	1.80	116

[a] Ice conditions.

Daily gage height, in feet, of South Platte River at South Platte, Colo., for 1910–11.

[Miss A. Vermillion, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	2.6	2.0	1.9	2.6	3.3	3.4	2.8	2.65	2.0	1.9	1.9	1.5
2	2.4	2.1	2.0	2.65	3.3	3.4	2.8	3.25	2.05	1.9	1.85	1.5
3	2.5	2.0	2.2	2.65	3.3	3.4	2.9	3.4	2.0	1.9	1.85	1.6
4	2.3	1.9	2.2	2.5	3.4	3.4	2.85	3.3	2.05	1.9	1.85	1.6
5	2.3	1.9	2.5	2.5	3.4	3.25	2.85	3.15	2.0	1.85	1.95	1.4
6	2.5	1.9	2.6	2.45	3.25	3.25	2.8	3.2	1.9	1.9	1.9	1.4
7	2.6	1.7	2.55	2.5	3.2	3.35	2.75	3.1	1.85	1.9	1.9	1.45
8	2.7	1.7	2.65	2.5	3.15	3.3	2.65	2.9	1.85	1.95	2.0	1.6
9	2.7	1.7	2.7	2.5	3.15	3.25	2.55	2.75	1.95	1.9	2.0	1.6
10	2.5	1.65	3.55	2.5	3.2	3.2	2.1	3.35	1.95	1.9	2.0	1.65
11	2.5	1.7	3.55	2.55	3.2	3.15	2.05	3.35	1.85	1.95	2.05	1.6
12	2.6	1.7	3.4	2.6	3.25	3.2	2.0	3.45	1.85	1.9	2.05	1.6
13	2.6	1.75	3.3	2.7	3.35	3.1	2.0	3.4	1.9	1.8	2.0	1.7
14	2.45	1.8	3.3	2.85	3.45	3.2	2.0	3.25	1.9	1.85	1.95	1.55
15	2.5	1.9	3.3	2.8	3.45	3.1	2.05	2.35	1.9	1.95	2.0	1.65
16	2.3	2.0	3.3	2.65	3.4	3.15	2.05	2.25	1.9	2.05	2.0	1.65
17	2.4	1.9	3.25	2.7	3.35	3.2	2.05	2.4	1.9	2.1	1.9	1.7
18	2.5	1.95	3.3	2.7	3.55	3.15	2.05	2.5	1.9	2.05	1.95	1.8
19	2.5	2.0	3.25	2.75	3.5	3.1	1.9	2.45	1.9	2.05	1.95	1.9
20	2.6	2.1	3.3	2.8	3.3	2.9	1.95	2.45	1.9	2.1	1.85	1.8
21	2.6	2.2	3.25	2.95	3.25	2.7	2.0	2.65	1.95	2.1	1.85	1.9
22	2.55	2.25	3.2	2.9	3.35	2.75	2.0	2.7	2.05	2.15	1.8	1.9
23	2.6	2.2	3.25	2.95	3.55	2.7	2.0	2.7	2.05	2.15	1.75	1.8
24	2.2	2.2	3.2	3.0	3.6	2.65	2.2	2.7	2.05	2.1	1.85	1.95
25	2.2	2.0	3.05	3.05	3.55	2.65	2.6	2.25	2.0	2.1	1.85	2.0
26	2.2	2.1	3.0	3.05	3.4	2.5	2.55	2.05	2.0	2.05	1.75	1.95
27	2.0	2.1	2.85	3.1	3.4	2.45	2.55	2.05	2.0	2.0	1.7	1.9
28	2.1	2.0	2.75	3.15	3.45	2.4	2.6	2.05	2.0	2.0	1.55	1.9
29	2.2	....	2.75	3.25	3.45	2.4	3.3	2.1	2.0	2.05	1.6	1.9
30	2.1	....	2.6	3.3	3.4	2.75	3.25	2.0	2.0	2.0	1.55	1.9
31	2.15	....	2.55	....	3.4	....	3.4	2.0	....	1.95	....	1.9
1911.												
1	....	1.6	1.65	1.6	2.15	2.75	3.15	2.35	2.1	2.0	1.65	......
2	....	1.55	1.6	1.9	2.1	2.85	3.4	2.3	2.25	1.95	1.6	......
3	2.05	1.55	1.55	2.2	2.0	2.85	3.75	2.35	2.2	1.85	1.65	......
4	2.0	1.55	1.6	2.35	2.0	2.85	3.4	2.45	2.15	2.05	1.75	......
5	2.05	1.6	1.6	2.4	2.1	2.9	3.55	2.95	2.15	2.1	1.75	1.25
6	1.9	1.55	1.6	2.4	2.2	2.8	3.9	2.9	2.1	2.3	1.65	1.7
7	1.7	1.6	1.55	2.25	2.3	2.8	3.95	2.75	2.05	2.0	1.65	1.75
8	1.65	1.55	1.6	2.1	2.4	2.75	4.3	2.35	2.0	1.9	1.7	1.3
9	1.75	1.55	1.6	2.05	2.45	2.85	4.25	2.8	2.0	1.8	1.7	1.1
10	2.0	1.55	1.6	1.9	2.55	2.75	4.2	2.85	1.95	1.7	1.75	1.1

Daily gage height, in feet, of South Platte River at South Platte, Colo., for 1910–11—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
11	2.0	1.6	1.65	1.85	2.2	2.7	4.2	2.9	1.9	1.65	1.75	......
12	1.95	1.6	1.5	1.85	2.05	2.7	4.15	2.45	1.8	1.6	1.6	......
13	1.85	1.6	1.45	1.8	2.35	2.7	4.2	2.35	1.8	1.6	1.55	......
14	1.7	1.55	1.45	1.8	2.35	2.65	4.2	2.3	1.8	1.6	1.75	......
15	1.65	1.55	1.45	1.7	2.55	2.7	4.15	2.3	1.8	1.6	1.65	......
16	1.65	1.6	1.55	1.75	2.6	2.85	4.15	2.3	1.8	1.6	1.65	......
17	1.65	1.6	1.55	1.8	2.6	2.9	4.2	2.3	1.8	1.6	1.6	......
18	1.55	1.6	1.5	1.75	2.65	2.8	3.2	2.35	1.85	1.6	1.6	......
19	1.6	1.55	1.55	1.8	2.75	2.8	2.85	2.25	1.85	1.6	1.65	......
20	1.6	1.45	1.45	1.8	2.7	2.8	3.5	2.2	1.85	1.55	1.6	......
21	1.65	1.45	1.5	1.8	2.9	3.0	3.5	2.2	1.85	1.55	1.6	......
22	1.7	1.8	1.55	1.9	3.0	2.9	3.55	2.45	1.85	1.55	1.65	......
23	1.55	2.0	1.5	1.95	3.0	3.0	3.6	2.75	1.85	1.6	1.5	......
24	1.65	2.05	1.5	2.1	3.0	3.0	3.55	2.7	1.8	1.65	1.5	......
25	1.7	2.0	1.55	2.2	3.0	3.0	3.55	2.7	1.8	1.65	1.6	......
26	1.7	1.7	1.5	2.2	3.05	3.0	3.6	2.6	1.85	1.65	1.7	......
27	1.6	1.6	1.4	2.15	2.95	3.0	3.35	2.1	1.85	1.65	1.65	......
28	1.6	1.65	1.5	2.1	2.8	3.05	3.15	2.1	1.85	1.65	......	......
29	1.6	......	1.45	2.2	2.75	3.05	3.1	2.0	1.85	1.7	......	......
30	1.65	......	1.5	2.3	2.65	3.15	2.85	2.0	1.95	1.65	......	......
31	1.6	......	1.55	......	2.6	......	2.45	2.05	......	1.65	......	......

NOTE.—Ice present Jan. 1 to 23 and Dec. 16 to 31, 1910. Gage heights for 1910, published in Water-Supply Paper 286, are in error as necessary corrections were not applied; corrected gage heights presented in above table.

Ice present Jan. 1 to Feb. 26 and Nov. 26 to Dec. 31, 1911.

Daily discharge, in second-feet, of South Platte River at South Platte, Colo., for 1910–11.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	200	182	160	354	605	600	388	400	182	162	136	68
2	200	206	182	370	600	600	388	610	194	162	126	68
3	200	182	234	370	600	598	420	660	182	160	126	83
4	200	160	234	322	635	598	404	610	194	160	126	83
5	200	160	322	322	630	540	404	545	182	150	146	68
6	225	160	354	306	570	540	388	560	160	155	136	68
7	225	120	338	322	550	576	373	510	150	155	136	68
8	225	120	370	322	530	558	343	430	150	160	156	83
9	225	120	386	322	530	540	313	365	171	155	156	83
10	225	111	710	322	548	522	197	630	171	153	156	90
11	215	120	710	338	548	505	186	630	150	158	167	83
12	215	120	650	354	560	522	175	670	150	152	167	83
13	215	130	610	386	600	488	175	650	160	130	156	98
14	215	140	610	440	630	522	175	590	160	140	146	76
15	215	160	610	422	625	488	186	276	160	160	156	70
16	210	182	610	370	615	505	186	248	160	180	156	70
17	210	160	590	386	590	522	186	290	160	195	136	70
18	210	171	610	386	665	505	186	322	160	178	146	70
19	210	182	590	404	650	488	153	306	160	176	146	70
20	210	206	610	422	572	420	164	306	160	190	126	70
21	205	234	590	476	555	358	175	370	171	190	126	75
22	205	248	570	458	590	373	175	386	194	200	116	75
23	205	234	590	476	660	358	175	386	194	200	107	75
24	205	234	570	494	680	343	220	386	194	186	126	75
25	208	182	513	513	660	343	375	248	180	186	126	80
26	212	206	494	513	605	298	365	194	190	175	107	80
27	170	206	440	532	605	284	380	194	180	160	98	80
28	190	182	404	552	620	270	410	194	178	160	76	80
29	218	......	404	590	620	270	670	206	178	170	83	85
30	195	......	354	605	602	373	640	182	178	160	76	85
31	205	......	338	......	602	......	690	182	......	145	......	85
1911.												
1	100	95	105	95	226	438	617	303	340	237	100	100
2	100	85	95	160	212	480	732	256	390	220	90	100
3	100	85	86	240	185	480	908	303	360	190	95	105
4	105	85	95	283	185	480	732	337	335	245	115	105
5	105	95	95	298	212	500	807	529	330	260	115	105

Daily discharge, in second-feet, of South Platte River at South Platte, Colo., for 1910–11—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907–8.												
6	110	85	95	298	240	460	986	508	310	320	95	105
7	115	95	86	254	268	460	1,010	446	290	225	95	115
8	105	85	95	212	298	440	1,200	303	270	195	105	115
9	105	85	95	198	314	485	1,180	466	270	170	105	115
10	110	85	95	160	347	445	1,150	487	250	140	115	115
11	110	95	105	148	238	428	1,150	508	235	130	115	115
12	110	95	77	148	195	428	1,120	337	210	115	85	115
13	110	95	70	137	283	426	1,150	303	205	115	77	115
14	115	86	70	137	283	408	1,150	286	205	110	115	115
15	105	86	70	115	355	426	1,120	286	200	110	95	115
16	105	95	86	126	370	487	1,120	286	200	108	95	115
17	105	95	86	137	370	508	1,150	286	200	108	85	110
18	85	95	77	126	392	466	640	308	210	105	85	110
19	95	100	86	137	430	466	487	280	210	103	95	110
20	95	100	70	137	412	466	782	280	210	95	85	110
21	105	105	77	137	490	550	782	290	210	92	85	110
22	115	105	86	160	535	508	807	390	205	92	95	110
23	85	105	77	172	535	550	832	525	205	100	70	110
24	105	110	77	212	535	550	807	515	190	110	70	105
25	115	110	86	240	535	550	807	535	190	110	85	105
26	115	115	77	240	560	550	832	510	200	110	85	105
27	95	95	63	226	515	550	709	335	200	108	90	105
28	95	105	77	212	455	572	617	345	200	105	95	105
29	95	......	70	240	435	572	594	325	195	115	95	105
30	95	......	77	268	400	617	487	325	220	105	100	105
31	95	......	86	......	380	......	337	332	......	105	......	105

NOTE.—Daily discharge for this station for 1910, as published in Water-Supply Paper 286, in error because of noncorrection of gage heights and method of computing; corrected determination presented herewith: Daily discharge Jan. 1 to 23 and Dec. 16 to 31, 1910, estimated because of ice; discharge Feb. 16 to Apr. 27, June 6 to July 19, Aug. 12 to Sept. 24, and Nov. 1 to 22, 1910, determined from fairly well-defined curves; indirect method for shifting channels used for the remaining periods of 1910.

Daily discharge Jan. 1 to Feb. 26 and Nov. 26 to Dec. 31, 1911, estimated because of ice; discharge Feb. 27 to Aug. 18, 1911, determined from a curve fairly well defined between 50 and 1,200 second-feet; indirect method for shifting channels used from Aug. 19 to Nov. 25, 1911.

Monthly discharge of South Platte River at South Platte, Colo., for 1910–11.

[Drainage area, 2,610 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1910.					
January	225	170	209	12,800	C.
February	248	111	172	9,560	B.
March	710	160	437	26,900	B.
April	605	306	415	24,700	B.
May	680	530	602	37,000	B.
June	600	270	464	27,600	B.
July	690	153	312	19,200	B.
August	670	182	404	24,900	B.
September	194	150	171	10,200	B.
October	200	130	167	10,200	B.
November	167	76	131	7,800	B.
December	98	68	77.3	4,750	B.
The year	710	68	298	216,000	
1911.					
January	115	85	103	6,360	B.
February	115	85	95.4	5,300	B.
March	105	63	83.6	5,140	B.
April	298	95	188	11,200	A.
May	560	185	361	22,200	A.
June	617	408	492	29,200	A.
July	1,200	337	865	53,100	A.
August	535	280	373	22,900	A.
September	390	190	242	14,400	A.
October	320	92	144	8,830	A.
November	115	70	94.4	5,620	B.
December	115	100	109	6,700	C.
The year	1,200	63	264	191,000	

NOTE.—Monthly estimates for this station, for 1910, as published in Water Supply Paper 286, are in error, and therefore the revised estimates are published herewith.

SOUTH PLATTE RIVER AT DENVER, COLO.

Location.—At the Sixteenth Street viaduct in Denver; 500 feet below mouth of Cherry Creek.

Records available.—May 7, 1895, to December 31, 1911.

Drainage area.—3,840 square miles.

Gage.—Automatic recording gage installed August 12, 1909. The original gage was located at the Twenty-third Street viaduct. In July, 1895, a new gage was installed at the Fifteenth Street bridge. In August, 1898, an inclined staff gage was placed on the opposite side of the river, but referred to the same datum. This gage was destroyed by high water in June, 1900, and for the remainder of the year the gage installed in July, 1895, was used. This gage was stolen, and a new one was placed between the Fifteenth Avenue and Sixteenth Avenue bridges May 15, 1901, reading to the same datum. This gage also was stolen and was replaced on June 10, 1903, by a vertical staff near the same place and having the same datum. The automatic gage is referred to practically the same datum as the preceding vertical staff.

Channel.—Shifting.

Discharge measurements.—Made from the Fifteenth Street bridge during high water and by wading at low-water stages.

Winter flow.—The flow at this point is seldom affected by ice.

Diversions.—Between this station and the one at South Platte there are court decrees for diversion from South Platte River of 2,226 second-feet and from intervening tributaries of 1,466 second-feet.

Cooperation.—Since 1907 station has been maintained by the State engineer, by whom the records are furnished.

Discharge measurements of South Platte River at Denver, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 17	Turner and Clayton	1.18	179	July 31	Bundy and Bunger	1.46	341
Feb. 24	Thos. Grieve	1.08	110	Aug. 7	.....do	1.15	216
Mar. 11	F. Cogswell	1.10	110	14	Grieve and Bundy	1.28	216
Apr. 4	Turner and Clayton	1.33	177	21	Bundy and Bunger	1.35	230
May 1	Thos. Grieve	1.52	254	28	Hezmalhalch and Bunger	1.40	242
June 19	C. C. Hezmalhalch	1.69	331	Sept. 11	.....do	1.21	160
24	F. Cogswell	1.72	396	16	F. Cogswell	1.00	114
July 5	Bunger and Hezmalhalch	1.78	463	Oct. 2	Hezmalhalch and Bunger	1.03	111
11	Bundy and Bunger	1.93	591	30	.....do	.89	89.0
24	Bunger and Hezmalhalch	2.16	750	Dec. 4	Grieve and Bunger	.74	71.0

Daily gage height, in feet, of South Platte River at Denver, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.85	0.95	1.1	0.9	1.4	1.55	1.65	1.25	1.2	1.1	0.95	0.95
2	.8	.9	1.15	.8	1.35	1.7	1.9	1.2	1.2	.95	.9	1.1
3	.8	.9	1.2	1.0	1.3	1.65	2.4	1.15	1.45	1.0	.9	.95
4	.85	.8	1.05	1.3	1.2	1.6	2.35	1.15	1.45	.9	.85	.8
5	1.0	.95	1.0	1.35	1.25	1.55	1.75	1.25	1.3	1.1	.85	.95
6	1.1	1.0	1.0	1.4	1.25	1.6	1.8	1.25	1.3	1.25	.85	.9
7	1.1	.9	1.1	1.5	1.3	1.45	2.3	1.15	1.3	1.2	.90	1.05
8	1.15	.9	1.05	1.5	1.35	1.55	2.1	.95	1.2	1.05	.9	1.15
9	1.1	.9	1.0	1.25	1.4	1.6	2.15	1.05	1.2	1.0	.9	1.1
10	1.15	.95	1.05	1.15	1.45	1.6	2.0	1.05	1.15	.95	.85	.95

Daily gage height, in feet, of South Platte River, at Denver, Colo., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	1.1	.95	1.1	1.15	1.45	1.5	1.95	2.25	1.05	1.0	.8	.95
12	1.05	1.0	1.0	1.05	1.4	1.5	1.85	2.0	1.05	.95	.8	.9
13	1.05	1.0	.9	1.0	1.35	1.45	1.9	1.95	1.05	.85	1.0	.8
14	1.1	1.0	.95	1.05	1.4	1.5	1.95	1.3	1.0	.85	1.05	.8
15	1.05	1.0	.85	1.05	1.4	1.5	1.95	1.35	1.05	.9	1.05	.9
16	1.0	.95	.9	1.0	1.5	1.75	2.2	1.3	1.1	.95	1.05	.9
17	1.05	1.0	.9	1.0	1.5	2.05	2.35	1.25	.95	.95	1.1	.95
18	1.05	1.0	.9	.95	1.5	2.2	2.25	1.25	.9	.95	.95	1.0
19	1.0	1.05	.8	.95	1.4	1.7	1.55	1.3	.95	.95	.9	1.0
20	1.0	1.0	.9	.9	1.6	1.7	1.55	1.3	.95	1.0	.85	.95
21	1.0	.85	.85	.95	1.5	1.7	1.7	1.3	.95	.9	.85	.9
22	1.0	.75	.85	.95	1.5	1.9	1.65	1.3	.9	.85	.75	.9
23	.9	.75	.85	1.0	1.35	1.85	1.65	1.5	.9	.95	.75	.95
24	1.0	1.1	.9	1.05	1.4	1.8	2.15	1.85	.85	.9	.8	.95
25	1.05	1.3	.9	1.15	1.35	1.7	2.2	1.9	.9	.9	.9	.9
26	1.1	1.25	.8	1.1	1.4	1.65	2.2	1.95	.85	.85	.85	.85
27	1.1	1.2	.9	1.1	1.45	1.7	2.1	1.7	.9	.95	.85	.7
28	1.0	1.1	.85	1.15	1.35	1.7	1.95	1.4	.95	.9	.75	.75
29	1.0	....	.85	1.2	1.4	1.7	1.8	1.3	.95	.9	.75	.9
30	1.0	....	.8	1.45	1.5	1.6	1.65	1.3	1.0	.95	.85	.9
31	1.0	....	.9	....	1.45	....	1.45	1.2	....	.9	....	.9

Daily discharge, in second-feet, of South Platte River at Denver, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	Juna.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	78	102	115	70	205	268	390	250	165	135	100	100
2	65	85	128	55	188	335	510	230	165	100	90	135
3	65	85	140	90	170	312	815	215	250	110	90	100
4	78	60	102	170	140	290	780	215	250	90	82	75
5	115	95	90	188	155	268	450	250	195	135	82	100
6	150	110	90	205	155	290	475	250	195	180	82	90
7	150	80	115	245	170	225	760	215	195	165	90	122
8	168	80	102	245	188	268	640	145	165	122	90	150
9	150	80	90	155	205	290	680	165	165	110	90	135
10	168	90	102	132	225	290	630	160	150	100	82	100
11	150	90	115	132	225	245	602	650	122	110	75	100
12	132	105	90	102	205	245	540	570	122	100	75	90
13	132	105	70	90	188	225	570	520	122	82	110	75
14	150	105	80	102	205	245	602	195	110	82	122	75
15	132	100	62	102	205	245	602	212	122	90	122	90
16	115	85	70	90	245	360	770	195	135	100	122	90
17	132	95	70	90	245	532	890	180	100	100	135	100
18	132	95	70	80	245	630	810	180	90	100	100	110
19	115	110	55	80	205	335	378	195	100	100	90	110
20	115	90	70	70	290	345	378	195	100	110	82	100
21	115	55	62	80	245	350	455	195	100	90	82	90
22	115	50	62	80	245	470	428	195	90	82	68	90
23	90	50	62	90	188	455	428	270	90	100	68	100
24	115	115	70	102	205	435	735	432	82	90	75	100
25	132	170	70	128	188	390	770	460	90	90	90	90
26	150	155	55	115	205	370	770	490	82	82	82	82
27	150	140	70	115	225	400	700	355	90	100	82	62
28	115	115	62	128	188	400	602	230	100	90	68	68
29	115	....	62	140	205	400	510	195	100	90	68	90
30	115	....	55	225	245	365	428	195	110	100	82	90
31	115	....	70	....	225	....	332	165	....	90	....	90

Monthly discharge of South Platte River at Denver, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	168	65	123	7,580
February	170	50	96	5,350
March	140	55	81	5,010
April	245	55	123	7,330
May	290	140	207	12,700
June	630	225	343	20,400
July	890	332	595	36,600
August	650	145	270	16,600
September	650	145	132	7,840
October	180	82	104	6,400
November	135	68	89	5,310
December	150	62	98	5,950
The year	890	50	189	137,000

SOUTH PLATTE RIVER NEAR KERSEY, COLO.

Location.—At highway bridge in sec. 9, T. 5 N., R. 64 W., 1¼ miles north of Kersey, 2 miles below the entrance of Lone Tree Creek, an intermittent stream, and 3 miles below the mouth of Cache la Poudre River.

Records available.—April 27, 1901, to October 31, 1903; March 1, 1905, to December 31, 1911.

Drainage area.—9,500 square miles.

Gage.—A chain gage, placed in the fall of 1906 in each of the two channels in which the river flows. These gages were referred to a datum slightly different from that of the original gage, but have remained permanent since. The original gage, a vertical staff, was used until June 14, 1906, when the observer moved it 20 feet south. This gage was placed 0.30 foot too high, and all readings were corrected by that amount until the chain gages were placed in position.

Channel.—Shifting.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes slight backwater for a few days during the winter.

Diversions.—Between this station and Denver there are court decrees for diversions of 3,764 second-feet from the South Platte, and 17,000 second-feet from intervening tributaries, besides numerous flood-water decrees.

Accuracy.—Although the channel is shifting, sufficient discharge measurements have been obtained to enable estimates of flow to be made which may be regarded as reliable.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of South Platte River near Kersey, Colo., in 1911.

Date.	Hydrographer.	Gage No. 2.		Date.	Hydrographer.	Gage No. 1.	
		Gage height.	Discharge.			Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 30	R. H. Fletcher	2.74	263	Jan. 30	R. H. Fletcher	2.78	160
Feb. 25	E. O. Christiansen	2.65	277	Feb. 25	E. O. Christiansen	2.58	125
Mar. 4	R. H. Fletcher	3.04	338	Mar. 4	R. H. Fletcher	2.98	188
27	.....do	2.30	149	27	.....do	2.38	81.3
Apr. 20	.....do	1.36	26.9	Apr. 20	.....do	1.98	37.0
May 27	R. C. Miles	1.40	32.4	May 27	R. C. Miles	1.96	43.3
June 27	E. O. Christiansen	1.74	55.2	June 27	E. O. Christiansen	2.11	47.2
July 13	G. H. Russell	1.90	78.5	July 13	G. H. Russell	2.15	58.8
Aug. 14	R. H. Fletcher	2.25	96.0	Aug. 14	R. H. Fletcher	2.27	67.5
Sept. 14	G. H. Russell	1.63	37.7	Sept. 14	G. H. Russell	2.13	53.6
Oct. 31	.....do	2.90	234	Oct. 31	.....do	2.80	140
Dec. 13	R. H. Fletcher	2.82	197	Dec. 13	R. H. Fletcher	2.80	154

Daily gage height, in feet, of South Platte River at gages Nos. 1 and 2 near Kersey, Colo., for 1911.

[Mrs. J. C. Maisner, observer.]

Gage No. 1.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.75	2.8	2.85	2.25	2.02	2.4	2.18	2.0	2.0	2.1	2.78	2.9
2	2.85	2.8	2.9	2.3	2.05	2.4	2.2	2.5	2.5	2.1	2.68	2.9
3	3.25	2.75	2.95	2.3	2.02	2.4	2.22	2.5	2.5	2.1	2.6	2.9
4	3.42	2.72	2.95	2.3	2.0	2.0	2.25	2.5	2.5	2.1	2.6	2.9
5	3.52	2.7	2.95	2.3	2.1	2.0	2.6	2.5	2.5	2.1	2.65	2.9
6	3.35	2.7	2.9	2.18	2.1	2.0	3.2	2.5	2.5	2.1	2.65	2.88
7	2.95	2.7	2.7	2.2	2.12	2.0	2.88	2.5	2.5	2.1	2.65	2.82
8	3.0	2.7	2.62	2.2	2.3	2.25	2.82	2.5	2.3	2.1	2.7	2.85
9	2.9	2.7	2.55	2.18	2.3	2.25	2.8	2.0	2.1	2.1	2.8	2.85
10	3.3	2.65	2.5	2.1	2.3	2.02	2.72	2.5	2.1	2.1	2.9	2.8
11	3.2	2.6	2.5	2.08	2.2	2.4	2.56	2.3	2.1	2.35	2.9	2.8
12	3.12	2.52	2.5	2.15	1.9	2.2	2.28	2.3	2.3	2.55	2.98	2.78
13	3.5	2.5	2.45	2.1	2.4	2.4	2.14	2.28	2.1	2.82	3.25	2.8
14	3.25	2.5	2.4	2.1	2.2	2.5	2.1	2.22	2.1	2.92	3.1	2.8
15	2.9	2.5	2.4	2.1	2.3	2.62	2.1	2.3	2.12	2.95	3.15	2.9
16	2.9	2.45	2.4	2.2	2.25	2.6	2.1	2.25	2.1	3.0	3.15	2.8
17	2.85	2.4	2.4	2.5	2.0	2.45	2.1	2.25	2.12	3.0	3.1	2.8
18	2.85	2.4	2.4	2.5	2.0	2.58	2.1	2.25	2.1	3.0	3.5	2.8
19	2.85	2.42	2.35	2.0	2.0	2.35	2.22	2.25	2.1	3.0	3.25	2.8
20	2.8	2.5	2.35	2.0	2.0	2.15	2.55	2.25	2.1	3.0	3.0	2.8
21	2.8	2.5	2.35	1.9	1.9	2.18	2.18	2.3	2.1	3.0	3.5	2.82
22	2.8	2.5	2.3	2.0	1.9	2.3	2.15	2.3	2.1	3.0	3.5	2.92
23	2.8	2.5	2.3	2.0	2.4	2.3	2.12	2.5	2.1	3.0	2.98	2.9
24	2.8	2.5	2.3	2.0	2.4	2.25	2.1	2.5	2.1	2.9	2.88	2.85
25	2.8	2.55	2.3	2.0	2.5	2.2	2.1	2.5	2.3	2.7	2.85	2.85
26	2.8	2.65	2.35	1.9	2.0	2.2	2.1	2.3	2.55	2.7	2.8	2.82
27	2.8	2.7	2.4	2.0	2.0	2.15	2.1	2.2	2.5	2.8	2.82	2.8
28	2.8	2.8	2.4	2.5	2.0	2.15	2.1	2.3	2.5	2.8	2.88	3.75
29	2.75	......	2.4	2.1	2.0	2.18	2.25	2.22	2.1	2.8	2.85	3.58
30	2.75	......	2.4	2.1	2.0	2.21	2.5	2.1	2.1	2.8	2.85	3.3
31	2.8	......	2.35	......	2.15	......	2.25	2.3	......	2.82	......	3.22

Gage No. 2.

1	......	2.9	3.0	2.3	1.58	1.5	1.85	1.65	1.7	1.8	2.85	2.9
2	......	2.9	3.0	2.22	1.6	1.52	1.85	1.68	1.7	1.8	2.75	2.92
3	......	2.85	3.32	2.2	1.52	1.5	1.92	1.68	1.75	1.8	2.7	2.9
4	......	2.85	3.32	2.2	1.5	1.5	1.98	1.7	1.75	1.8	2.65	2.85
5	......	2.8	3.0	2.2	1.5	1.5	2.4	1.7	1.7	1.9	2.65	2.85
6	3.4	2.8	2.95	2.18	1.5	1.5	3.32	1.7	1.7	1.95	2.65	2.85
7	3.3	2.8	2.7	2.1	1.42	1.5	2.85	1.7	1.7	1.92	2.7	2.8
8	3.18	2.8	2.68	2.1	1.38	1.52	2.75	1.7	1.7	1.9	2.78	2.8
9	3.22	2.8	2.5	2.5	1.3	1.52	2.75	1.65	1.7	1.92	2.92	2.8
10	3.22	2.75	2.45	2.0	1.32	1.72	2.68	1.62	1.7	1.92	3.0	2.8
11	3.3	2.7	2.45	1.92	1.3	1.58	2.45	1.7	1.68	2.45	3.0	2.8
12	3.25	2.62	2.4	1.8	1.3	1.6	2.32	1.75	1.65	2.8	3.5	2.78
13	3.2	2.6	2.35	1.62	1.3	1.55	1.95	2.22	1.62	3.0	3.1	2.8
14	3.15	2.58	2.35	1.65	1.3	1.55	1.88	2.15	1.6	3.0	3.2	2.75
15	3.1	2.52	2.3	1.62	1.32	2.2	1.85	1.78	1.62	3.0	3.25	2.68
16	3.3	2.5	2.3	1.6	1.35	2.68	1.8	1.7	1.6	3.0	3.25	2.78
17	2.95	2.5	2.28	1.55	1.3	2.48	1.8	1.72	1.62	3.0	3.18	2.8
18	2.9	2.5	2.25	1.5	1.28	2.62	1.8	1.72	1.6	3.5	3.1	2.8
19	3.0	2.5	2.28	1.45	1.35	2.25	2.05	1.7	1.6	3.5	3.1	2.85
20	2.92	2.55	2.25	1.42	1.35	2.0	2.28	1.7	1.65	3.5	3.1	2.85
21	2.9	2.5	2.25	1.3	1.45	2.15	2.02	1.7	1.65	3.5	3.1	2.85
22	2.9	......	2.2	1.3	1.4	2.28	1.98	1.7	1.65	3.5	3.3	2.98
23	2.9	......	2.2	1.3	1.52	2.3	1.85	1.7	1.7	3.0	2.95	2.92
24	2.9	......	2.2	1.3	1.55	2.22	1.8	1.7	1.7	2.88	2.9	2.9
25	2.9	2.62	2.2	1.3	1.55	1.88	1.8	1.7	1.7	2.68	2.8	2.85
26	2.9	2.75	2.25	1.3	1.4	1.85	1.82	1.72	1.7	2.65	2.8	2.9
27	2.9	......	2.3	1.3	1.4	1.7	1.78	2.02	1.75	2.8	2.78	2.9
28	2.9	2.95	2.32	1.3	1.45	1.68	1.78	2.28	1.72	2.8	2.85	3.95
29	2.85	......	2.35	1.4	1.5	1.65	1.72	2.22	1.75	2.85	2.8	3.95
30	2.85	......	2.35	1.5	1.5	1.82	1.72	2.25	1.75	2.9	2.82	3.85
31	2.88	......	2.3	......	1.5	......	1.68	1.85	......	2.9	......	3.72

NOTE.—Gage No. 1: Ice present Jan. 1 to 14 and Dec. 28 to 31. Gage No. 2: Ice present Jan. 1 to 16 and Dec. 28 to 31.

Daily discharge, in second-feet, of South Platte River at gages No. 1 and No. 2 near Kersey, Colo., for 1911.

Gage No. 1.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	154	167	167	67	40	77	56	46	46	50	139	170
2	178	167	177	72	42	77	57	90	90	50	119	170
3	180	156	187	72	41	77	59	90	90	50	103	170
4	180	144	183	73	40	46	62	90	90	50	103	170
5	180	144	163	73	45	46	103	90	90	50	113	170
6	180	144	170	60	45	46	257	90	90	50	113	165
7	180	144	128	61	45	46	165	90	90	50	113	148
8	180	144	112	61	62	62	148	90	67	50	123	156
9	185	144	104	59	62	62	143	46	50	50	143	156
10	185	134	92	53	62	47	127	90	50	50	170	143
11	185	125	92	51	54	77	98	67	50	72	170	143
12	185	108	92	55	40	57	65	67	67	96	192	139
13	185	108	87	51	74	77	53	65	50	148	272	143
14	185	108	80	50	53	90	50	59	50	175	226	143
15	190	108	80	48	62	107	50	67	51	184	242	170
16	190	102	81	53	67	103	50	62	50	197	242	143
17	178	95	82	85	42	84	50	62	51	197	226	143
18	178	95	82	85	42	100	50	62	50	197	356	143
19	178	98	75	40	43	72	59	62	50	197	272	143
20	167	108	75	88	43	54	96	62	50	197	197	143
21	167	108	76	36	42	56	56	67	50	197	356	148
22	167	108	71	38	42	67	54	67	50	197	356	175
23	167	108	71	38	73	67	51	90	50	197	192	170
24	167	108	72	38	73	62	50	90	50	170	165	156
25	167	116	72	38	85	57	50	90	67	123	156	156
26	167	130	77	36	45	57	50	67	96	123	143	148
27	167	140	85	38	46	54	50	57	90	143	148	143
28	167	158	85	84	46	54	50	67	90	143	165	143
29	156	....	85	45	46	56	62	59	50	143	156	143
30	156	....	85	45	46	58	90	50	50	143	156	143
31	167	....	78	....	54	....	62	67	....	148	....	143

Gage No. 2.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	250	302	335	146	42	36	72	42	40	47	211	223
2	250	302	335	131	44	38	72	45	40	47	188	228
3	250	286	465	127	38	36	81	45	44	47	177	223
4	250	286	465	127	36	36	90	45	44	47	167	211
5	250	271	335	127	36	36	167	45	40	55	167	211
6	250	271	318	123	36	36	465	43	40	60	167	211
7	250	271	242	109	31	36	286	43	40	57	177	199
8	250	271	237	109	29	38	256	43	40	55	195	199
9	250	271	190	190	26	38	256	41	40	57	228	199
10	275	256	178	93	27	56	237	35	40	57	250	199
11	275	242	178	81	26	42	178	42	39	130	250	199
12	275	220	167	66	26	44	150	45	36	199	430	195
13	275	215	156	46	26	40	86	93	34	250	280	199
14	275	210	156	49	26	40	75	84	33	250	315	188
15	275	195	146	46	27	127	72	46	34	250	332	173
16	275	190	146	44	28	237	65	40	33	250	332	195
17	318	190	142	40	26	190	65	41	34	250	308	199
18	302	190	136	36	25	220	65	41	33	430	280	199
19	335	190	142	33	28	137	96	40	33	430	280	211
20	309	202	136	31	28	93	133	40	36	430	280	211
21	302	190	136	26	33	118	80	40	36	430	280	211
22	302	203	127	26	30	142	80	40	36	430	362	245
23	302	225	127	26	38	146	65	40	40	250	236	228
24	302	250	127	26	40	131	60	40	40	218	223	223
25	302	267	127	26	40	76	58	40	40	173	199	211
26	302	290	136	26	30	72	60	41	40	167	199	223
27	302	305	146	26	30	54	55	67	44	199	195	223
28	302	315	150	26	33	52	55	102	41	199	211	223
29	286	....	156	30	36	49	50	94	44	211	199	223
30	286	....	156	36	36	68	50	98	44	223	204	223
31	296	....	146	....	36	....	45	51	....	223	....	223

NOTE.—Gage No. 1: Daily discharge Jan. 1 to 14 and Dec. 28 to 31 estimated because of ice; discharge Jan. 15 to Feb. 25 and May 27 to Dec. 27 determined from a curve fairly well defined between 45 and 250 second-feet; discharge Feb. 26 to May 26 computed by indirect method for shifting channels.

Gage No. 2: Daily discharge Jan. 1 to 16 and Dec. 28 to 31 estimated because of ice; discharge Jan. 17 to Feb. 21, Mar. 1 to July 13, and Aug. 15 to Dec. 27 determined from a rating curve fairly well defined between 20 and 400 second-feet; discharge Feb. 22 to Feb. 28 and July 14 to Aug. 14 computed by indirect method for shifting channels.

Daily discharge, in second-feet, of South Platte River near Kersey, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	404	469	502	213	82	113	128	88	86	97	350	393
2	428	469	512	203	86	115	129	135	130	97	307	398
3	430	442	652	199	79	113	140	135	134	97	280	393
4	430	430	648	200	76	82	152	135	134	97	270	381
5	430	415	518	200	81	82	270	135	130	105	280	381
6	430	415	488	183	81	82	722	133	130	110	280	376
7	430	415	370	170	76	82	451	133	130	107	290	347
8	430	415	349	170	91	100	404	133	107	105	318	355
9	435	415	294	249	88	100	399	87	90	107	371	355
10	460	390	270	146	89	103	364	125	90	107	420	342
11	460	367	270	132	80	119	276	109	89	202	420	342
12	460	328	259	121	66	101	215	112	103	295	622	334
13	460	323	243	97	100	117	139	158	84	398	552	342
14	460	318	236	99	79	130	125	143	83	425	541	331
15	465	303	226	94	89	234	122	113	85	434	574	343
16	465	292	227	97	95	340	115	102	83	447	574	338
17	496	285	224	125	68	274	115	103	85	447	534	342
18	480	285	218	121	67	320	115	103	83	427	636	342
19	513	288	217	73	71	209	155	102	83	427	552	354
20	476	310	211	69	71	147	229	102	86	427	477	354
21	469	298	212	62	75	174	186	107	86	427	636	359
22	469	311	198	64	72	209	184	107	86	427	718	420
23	469	333	198	64	111	213	116	130	90	447	428	398
24	469	358	199	64	113	193	110	130	90	388	388	379
25	469	383	199	64	125	133	108	130	107	296	355	367
26	469	420	213	62	75	129	110	108	136	290	342	371
27	469	445	231	64	76	108	105	124	134	342	343	366
28	469	473	235	110	79	106	105	169	131	342	376	366
29	442	....	241	75	82	105	112	153	94	354	355	366
30	442	....	241	81	82	126	140	148	94	366	360	366
31	463	....	224	....	90	....	107	118	....	371	....	366

NOTE.—Determinations of daily discharge presented in above table represent the combined flow in the two channels.

Monthly discharge of South Platte River near Kersey, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	513	404	456	28,000
February	473	285	371	20,600
March	652	198	301	18,500
April	249	62	122	7,280
May	125	66	83.7	5,150
June	340	82	149	8,840
July	722	105	195	12,000
August	169	88	123	7,560
September	136	83	102	6,100
October	447	97	291	17,900
November	718	270	432	25,700
December	420	331	363	22,300
The year	722	62	249	180,000

NOTE.—These estimates represent the combined flow of both channels.

SOUTH PLATTE RIVER AT JULESBURG, COLO.

Location.—At highway bridge 1 mile south of Julesburg, about sec. 33, T. 12 N., R. 44 W. No important tributaries between the station and the Colorado-Nebraska State line, 1 mile distant. All the tributaries for 100 miles or more above the station are intermittent.

Records available.—April 2, 1902, to November 16, 1906; May 12, 1908, to December 31, 1911.

Drainage area.—20,600 square miles.

Gage.—When the station was reestablished in 1908 a gage was placed in each of the two main channels; both gages read practically the same as the original gage on the lower bridge 2,000 feet below the present site. The datum of the gages has remained unchanged.

Channel.—Shifting.

Discharge measurements.—Made from the pile bridge during high water, and by wading at low-water stages.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—Between Kersey and Julesburg there are court decrees for diversions of 5,316 second-feet from the South Platte, and diversions of 1,240 second-feet from intervening tributaries including Lodgepole Creek in Wyoming and Nebraska and Crow Creek in Wyoming, besides numerous flood decrees. Between the State line and the mouth diversions of 206 second-feet from the South Platte have been granted in Nebraska.

Accuracy.—Although the channel is shifting, sufficient measurements have been made to give fairly reliable discharge estimates.

Cooperation.—During 1911 this station was maintained in cooperation with the State engineer.

Discharge measurements of South Platte River at Julesburg, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 31[a]	R. H. Fletcher	2.46	683	July 14	G. H. Russell	0.85	4.6
Mar. 28	.....do	1.10	39.0	Aug. 15	R. H. Fletcher	[b].85	7.2
Apr. 21	.....do	.96	16.5	Sept. 15	G. H. Russell	.82	12.7
May 26	R. C. Miles	.90	17.9	Oct. 31	.....do	1.07	29.6
June 28	E. O. Christiansen	.90	7.5	Dec. 14[a]	R. H. Fletcher	1.04	17.1

[a] Ice present.

[b] Gage height to ground-water level caused by seepage. Gage 40 feet from edge of first channel.

Daily gage height, in feet, of South Platte River at Julesburg, Colo., for 1911.

[Elva McSparian, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.2	2.3	2.0	1.1	1.3	1.0	0.8	0.8	1.0	0.8	1.1	1.0
2	2.2	2.2	2.3	1.1	1.2	1.0	.8	.8	1.0	.8	1.1	1.0
3	2.2	2.2	2.2	1.1	1.2	.9	.8	.8	1.0	.8	1.1	......
4	2.3	2.0	2.0	1.1	1.2	.9	.8	.8	1.0	.9	1.1	......
5	2.4	2.0	1.5	1.1	1.2	.9	.8	.8	1.0	.9	1.1	......
6	2.4	2.0	1.6	1.1	1.1	.9	.8	.8	1.0	.9	1.1	......
7	2.4	2.0	1.6	1.1	1.1	.9	.8	.8	.9	.9	1.1	......
8	2.8	2.0	1.6	1.0	1.1	.9	.8	.8	.9	.9	1.1	......
9	2.8	1.9	1.5	1.0	1.1	.9	.8	.8	.9	1.0	1.1	......
10	2.8	2.0	1.4	1.0	1.0	.9	.8	.8	.9	1.0	1.1	......
11	2.8	1.9	1.4	1.0	1.0	.9	.8	.8	.9	1.0	1.1	......
12	2.8	1.9	1.3	1.0	1.0	.9	.8	.8	.9	1.0	1.1	......
13	2.8	1.9	1.3	1.0	1.0	.9	.8	.8	.9	1.0	1.1	......
14	2.8	1.8	1.2	1.0	.9	.9	.8	.8	.9	1.0	1.0	......
15	2.8	1.8	1.2	1.0	.9	1.0	.8	.8	.8	1.0	1.0	......
16	2.8	1.7	1.2	1.0	.9	1.3	.8	.8	.8	1.0	1.0	......
17	2.8	1.7	1.1	1.0	.9	1.2	.8	.8	.8	1.0	1.0	1.0
18	2.8	1.6	1.1	1.0	.9	1.1	.8	......	.8	1.0	1.0	1.0
19	2.8	1.6	1.1	1.0	.9	1.0	.8	1.7	.8	1.0	1.0	1.0
20	2.8	1.6	1.1	1.0	.9	1.0	.9	1.7	.8	1.0	1.0	1.0
21	2.8	1.6	1.1	.9	.9	.9	......	1.6	.8	1.0	1.0	1.0
22	2.8	1.5	1.1	1.0	.9	.9	1.0	1.5	.8	1.0	1.0	1.0
23	2.8	1.5	1.1	1.0	.9	.9	1.0	1.4	.8	1.0	1.0	1.0
24	2.8	1.5	1.1	1.0	.9	.8	1.0	1.4	.8	1.0	1.0	1.0
25	2.8	1.8	1.0	1.0	.9	.8	......	1.4	.8	1.0	1.0	1.0
26	2.8	2.0	1.1	1.0	.9	.8	......	1.4	.8	1.0	1.0	1.0
27	2.7	2.0	1.0	1.0	.9	.8	......	1.3	.8	1.1	1.0	1.0
28	2.7	2.0	1.2	.9	.9	......	......	1.2	.8	1.1	1.0	1.0
29	2.7	......	1.2	......	1.0	.8	.8	1.2	.8	1.1	1.0	1.0
30	2.7	......	1.2	1.3	1.0	......	.75	1.1	.8	1.1	1.0	1.0
31	2.5	......	1.1	......	1.0	......	.8	1.0	......	1.1	......	......

NOTE.—Ice present Jan. 4 to Feb. 1, Feb. 19 to Mar. 3, and Dec. 17 to 31.

Daily discharge, in second-feet, of South Platte River at Julesburg, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	230	680	670	34	75	21	8	8	21	8	34	21
2	230	675	670	34	52	21	8	8	21	8	34	21
3	230	670	670	34	52	12	8	8	21	8	34	21
4	300	670	670	34	52	12	8	8	21	12	34	21
5	350	670	153	34	52	12	8	8	21	12	34	21
6	350	670	210	34	34	12	8	8	21	12	34	21
7	350	670	210	34	34	12	8	8	12	12	34	19
8	700	670	210	21	34	12	8	8	12	12	34	19
9	700	510	153	21	34	12	8	8	12	21	34	19
10	700	670	112	21	21	12	8	8	12	21	34	19
11	700	510	112	21	21	12	8	8	12	21	34	19
12	700	510	81	21	21	12	8	8	12	21	34	19
13	700	510	81	21	21	12	8	8	12	21	34	19
14	700	375	57	21	12	12	8	8	12	21	21	18
15	700	375	57	21	12	21	8	8	8	21	21	18
16	700	270	57	21	12	75	8	8	8	21	21	18
17	700	270	38	21	12	52	8	8	8	21	21	18
18	700	195	38	21	12	34	8	25	8	21	21	18
19	700	195	38	21	12	21	8	270	8	21	21	18
20	700	195	38	21	12	21	12	270	8	21	21	18
21	700	195	38	12	12	12	21	195	8	21	21	18
22	700	142	38	21	12	12	21	142	8	21	21	18
23	700	142	38	21	12	12	21	105	8	21	21	18
24	700	142	38	21	12	8	21	105	8	21	21	18
25	700	375	24	21	12	8	21	105	8	21	21	18
26	700	670	38	21	12	8	21	105	8	21	21	18
27	685	670	24	21	12	8	12	75	8	34	21	18
28	685	670	52	12	12	8	12	52	8	34	21	18
29	685	....	52	40	21	8	8	52	8	34	21	18
30	685	....	52	75	21	8	7	34	8	34	21	18
31	685	....	34	....	21	....	8	21	....	34	....	18

NOTE.—Daily discharge Jan. 4 to Feb. 1, Feb. 19 to Mar. 3, and Dec. 17 to 31, estimated from a mean curve with a very small range; discharge interpolated for days for which gage readings are missing.

Monthly discharge of South Platte River at Julesburg, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	700	230	605	37,200	C.
February	680	142	463	25,700	C.
March	670	24	153	9,430	C.
April	75	12	25.9	1,540	C.
May	75	12	24.1	1,480	C.
June	75	8	16.7	996	C.
July	21	7	10.9	668	C.
August	270	8	54.6	3,360	C.
September	21	8	11.7	694	C.
October	34	8	20.4	1,250	C.
November	34	21	26.6	1,580	C.
December	21	18	18.2	1,120	C.
The year	700	7	118	85,000	

TARRYALL CREEK NEAR COMO, COLO.

Location.—At highway bridge in sec. 26, T. 8 S., R. 76 W., 1½ miles northeast of Como. No tributary within several miles of the station.

Records available.—July 21 to November 21, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge during high water and by wading during low water.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—There are court decrees for diversions of 255 second-feet from Tarryall Creek above the station.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Tarryall Creek near Como, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 28	O. M. Wimmer	1.22	12.0
Sept. 5	Fletcher and Waha	.86	9.4
5	H. B. Waha	.86	5.8

Daily gage height, in feet, of Tarryall Creek near Como, Colo., for 1911.

[Roy Truman, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Day.	July.	Aug.	Sept.	Oct.	Nov.
1						16				1.0	
2						17					
3				.85		18					
4					1.1	19					
5			.9			20					
6			.86			21	2.1				.7
7						22		1.0	.9		
8		.9				23				1.2	
9						24					
10				.9		25					
11						26			.8		
12						27	1.85				
13					2.3	28					
14						29		.9			
15		.9	.9			30					
						31	1.0				

NOTE.—Ice caused backwater Nov. 13 to Dec. 31.

TARRYALL CREEK NEAR JEFFERSON, COLO.

Location.—At Robbins's ranch, in sec. 6, T. 9 S., R. 74 W., 10 miles southeast of Jefferson, a short distance above the mouth of Rock Creek.

Records available.—October 23, 1910, to June 30, 1911. At the latter date the station was discontinued and a new one established near Como.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 309 second-feet from Tarryall Creek above the station, and for 898 second-feet from tributaries entering above.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station was maintained in cooperation with the United States Forest Service.

Discharge measurements of Tarryall Creek near Jefferson, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 7	Fletcher and Truman	[a] 1.30	0
Apr. 23	O. M. Wimmer	1.30	46.0

[a] Gage height to top of ice. River frozen to bottom.

Daily gage height, in feet, of Tarryall Creek near Jefferson, Colo., for 1911.

[Roy Truman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1		2.1	2.6		.75		16						
2						.65	17						1.6
3							18					.65	
4							19				1.0		
5						1.45	20						
6							21	1.7					
7	1.3						22						
8					.75		23				1.3		
9							24				1.1		
10							25				1.1		
11				1.05			26					.9	1.0
12							27						
13							28			2.5			.9
14							29						
15			2.7				30						
							31						

NOTE.—Creek frozen solid Jan. 7; water running over ice Jan. 21, Feb 1, and Mar. 1, 15, and 28.

TARRYALL CREEK NEAR HAYMAN, COLO.

Location.—At McLaughlin's ranch, in sec. 23, T. 11 S., R. 72 W., 6 miles northeast of Hayman post office, in the Pike National Forest. Nearest tributary a small stream entering from the north just below.

Records available.—October 23, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff. The datum was raised 0.28 foot in April, 1911, and all previous gage heights referred to the new datum.

Channel.—Apparently permanent.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 205 second-feet from Tarryall Creek between this station and the one near Jefferson.

Accuracy.—As the station has not been completely rated, no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Tarryall Creek near Hayman, Colo., in 1910–11.

Date.	Hydrographer.	Gage height.	Discharge.
1910.		*Feet.*	*Sec.-ft.*
Oct. 23	S. T. Harding	0.52	9.3
Nov. 18	G. H. Russell	.62	13.3
1911.			
Jan. 11[a]	O. M. Wimmer	.32	1.6
Apr. 26	....do	.92	33.3
July 9	E. O. Christiansen	1.95	133
Sept. 26	H. B. Waha	.55	12.4

[a] Ice conditions.

Daily gage height, in feet, of Tarryall Creek near Hayman, Colo., for 1910–11.

[F. C. Parrett, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1910.				1910.				1910.			
1				11				21			
2				12		0.62		22		0.57	0.42
3				13		.62		23		.52	
4				14				24			
5		0.72		15			0.52	25			
6			0.82	16				26			
7			.72	17				27	0.52		
8				18		.62		28			
9				19				29		.72	.32
10				20				30	.47		
								31			

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1		0.5			0.94				0.7			
2								1.2				
3												
4			1.5				3.2			0.7		
5	0.4											
6		.7										
7									.7			
8				0.8								
9							1.95					
10											0.75	
11	.3	1.3			.3			.85				
12								.9		.8		
13												
14		1.5					1.3		.55	.75		
15											.7	
16			1.7									
17							1.2					
18								.8		.7		0.6
19	.2								.55			
20		1.0				0.90						
21			.4									
22											.65	
23		.8									.7	
24	.25							.9				
25							1.2				.85	
26				.9				.85	.55	.95		
27												
28										.9		
29			.9				1.3				.8	
30	.4											
31								.75				

JEFFERSON CREEK AT JEFFERSON, COLO.

Location.—At highway bridge at Jefferson, in sec. 8, T. 8 S., R. 75 W. Nearest tributary enters 1½ miles below.

Records available.—October 17, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff, which was lowered 0.66 foot. All readings have been referred to the latter datum.

Channel.—Shifting.

Discharge measurements.—Made from the bridge at high water, and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions from Jefferson Creek of 167 second-feet above the station and 21 second-feet below. There is a decree of 546 second-feet diversion from Jefferson Lake.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Jefferson Creek at Jefferson, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Jan. 6	R. H. Fletcher	[a] 2.10	0
Apr. 22	O. M. Wimmer	[b] .97	9.9
Sept. 7	R. H. Fletcher	.90	4.2
7	H. B. Waha	.90	3.8

[a] Gage height to top of ice. River frozen to bottom. [b] Gage height reduced to new datum.

Daily gage height, in feet, of Jefferson Creek at Jefferson, Colo., for 1911.

[R. M. Truman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				0.96					0.86	0.90		
2		3.21	3.21		0.68	0.56	0.96		.96	.90	0.90	
3					.71	1.36	.86	(a)	.91	.85		
4					.74	1.41		(a)	.96	.80	.90	
5					.68	1.16	.76	(a)	.91	1.00	.85	
6	2.76				.66		.81	0.76	.96	.95	.85	
7					.66	.56	.66	.76		.90	1.10	
8					.66		.66	1.06		.90	1.00	1.60
9					.67		.66	.76	.90	.90	.90	
10					.54		(a)	.56	.90	.85		
11					.51		.51	.61	.80	.85	1.20	
12			3.26		.51		.51	.61	.80	.85		
13					.48	.51	.66	1.06	.80	.85	1.05	
14					.51	.96	.86	1.06		.80		
15					.56	.96	.76	.96	.80	.85	1.00	
16		3.26			.54	.68	.76	.96	.80	.95		
17	3.06			1.16	.51	.76	.56		.80		.90	
18					.54	.68	.51	.96	.80	.80	1.20	
19						.68	.51	.96		.90		
20			3.26					.96	.85	.90	1.10	
21					.56		.56			.90	1.00	
22				.97	.51	.66	.61	1.06	.80	.95	1.10	
23				.96	1.06	.76	.61	1.06		1.00	1.10	
24				.76	.86	.66	.61	.96	.80	.90	1.10	
25					.91	.66	.76	.96		1.00	1.20	
26				.81	.51		.76		.80	.95		
27				.87	.51		.56			1.00	1.20	
28				.86	.53	.54	.54	.96	.85	.92		
29					.54	.56	.56	.91		.90	1.30	
30						.64	.61		.90	.85		
31					.56	.64	.56			.80		

[a] Creek dry, as water was used above station for irrigation.

NOTE.—Creek frozen over Jan. 1 to Apr. 16 and Nov. 7 to Dec. 31; frozen solid Jan. 6. A very small flow Jan. 17.

MICHIGAN CREEK NEAR JEFFERSON, COLO.

Location.—At the highway bridge at Michigan Siding, in sec. 13, T. 8 S., R. 76 W., 2½ miles southwest of Jefferson. No tributary between the station and the mouth, 3½ miles below, and no important tributary for several miles above.

Records available.—October 17, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 104 second-feet from Michigan Creek above the station and 40 second-feet below.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Michigan Creek near Jefferson, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 6	R. H. Fletcher	[a] 2.00	0
Apr. 22	O. M. Wimmer	1.06	25.3
July 28	.....do	.85	2.7
Sept. 6	Fletcher and Waha	.95	8.8
6	H. B. Waha	.95	8.0

[a] Ice.

Daily gage height, in feet, of Michigan Creek near Jefferson, Colo., for 1911.

[R. M. Truman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				2.7	0.8		0.85					
2		2.8							1.0			
3			2.8			.9				.95		
4											1.1	
5						1.1	1.7	.9	1.0			
6	2.0				.72				.95			
7												
8				.8			1.3	1.0				
9												.65
10										1.0		
11							.95					
12									.85			
13			2.9								.8	
14							1.0			.95		
15						1.12		1.05	1.0			
16		2.8								1.1		
17	2.7			.8								
18												
19						1.0	1.0	1.0				
20			3.0									
21											.8	
22				1.08			1.1	1.2	.9			
23						1.0		1.1		1.2		
24												
25												
26				.9			.9		.9	1.1		
27					.8						.7	
28					.85		.7					
29								1.0				
30												
31							.7			1.1		

NOTE.—Creek frozen over Jan. 1 to Mar. 31 and Nov. 13 to Dec. 31; frozen solid Jan. 6, 17, and 28.

NORTH FORK OF SOUTH PLATTE RIVER AT GRANT, COLO.

Location.—At Grant post office, in sec. 9, T. 7 S., R. 74 W., in the Pike National Forest, 250 feet above the mouth of Geneva Creek.

Records available.—July 18, 1910, to December 31, 1911.

Drainage area.—51 square miles (measured from Forest Atlas).

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made from footbridge and by wading.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—There are no court decrees for diversions from the North Fork above the station, but there is a decree for a diversion of 8 second-feet from a tributary.

Accuracy.—Though the channel is somewhat shifting, sufficient measurements were obtained to make the estimates reliable. The diurnal fluctuations at this station are so great that the mean of two daily readings does not represent the mean discharge, especially in the spring, when the creek is melting during day and freezing during night.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of North Fork of South Platte River at Grant, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar 14[a]	R. H. Fletcher	1.50	8.1	Aug. 29	R. H. Fletcher	1.45	14.2
Apr 14[a]	W. B. Freeman	1.46	13.0	Sept. 8	.....do	1.44	15.2
21	O. M. Wimmer	1.65	22.7	8	Waha and Fletcher	1.52	20.3
June 11	J. B. Stewart	2.15	82.8	Nov. 3[a]	G. H. Russell	1.43	3.5
July 13	W. B. Freeman	1.96	52.1				

[a] Ice conditions.

Daily gage height, in feet, of North Fork of South Platte River at Grant, Colo., for 1911.

[Edmund Couch, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1							1.80					1.70
2					1.65	2.20			1.52			1.87
3											1.52	
4								1.60				1.85
5				1.35	2.05			1.60				
6						2.20						
7		1.55							1.40	1.50		
8							1.80		1.44			1.87
9	1.65							1.50			1.45	
10		1.55				2.20		1.50	1.40			
11	1.65				2.05	2.15						1.90
12						2.15				1.40		
13							1.94					2.00
14			1.50	1.46	2.05							2.00
15				1.37					1.40			1.90
16						2.15		1.55				1.85
17								1.52		1.40	1.75	
18						2.15						
19					2.20							
20				1.45	2.20					1.35		1.30
21				1.65					1.40			1.30
22									1.40			1.35
23						2.00					1.70	
24			1.35					1.52			1.70	
25							1.82				1.90	
26				1.65	2.10		1.82					
27						1.85						
28	1.65			1.70						1.35	1.67	
29					2.05		1.65	1.45	1.40			
30					2.05	1.80						
31												

Daily discharge, in second-feet, of North Fork of South Platte River at Grant, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	5	23	80	35	22	14	15	16....	10	76	80	47	18	14	14
2....	5	22	88	35	21	14	16	17....	10	80	80	45	17	14	14
3....	5	22	88	35	21	14	16	18....	10	84	80	44	17	14	13
4....	5	24	88	35	21	14	17	19....	10	88	76	43	17	14	13
5....	5	66	88	35	21	14	17	20....	12	88	72	42	17	14	12
6....	5	66	88	35	19	15	18	21....	22	85	68	41	17	14	12
7....	5	66	88	35	18	15	18	22....	22	83	64	40	17	14	12
8....	5	66	88	35	17	15	17	23....	22	80	59	39	17	14	12
9....	5	66	88	38	16	15	16	24....	22	78	55	38	17	14	12
10....	5	66	88	41	16	14	15	25....	22	75	50	37	17	14	12
11....	8	66	80	44	16	14	14	26....	22	73	45	37	16	14	12
12....	8	66	80	47	16	14	14	27....	24	70	40	32	16	14	12
13....	10	66	80	51	17	14	14	28....	26	68	38	27	15	14	12
14....	13	66	80	50	17	14	14	29....	24	66	37	22	14	14	12
15....	9	72	80	48	17	14	14	30....	24	66	35	22	14	15	12
								31....	......	73	......	22	14	......	12

NOTE.—Daily discharge determined as follows: Apr. 1 to 14, estimated; Apr. 15 to July 31, from a well-defined curve; Aug. 1 to 31, from a curve based on one measurement and shape of previous curves; Sept. 1 to 8, the indirect method for shifting channels; Sept. 9 to Oct. 31, from a poorly defined curve.

Monthly discharge of North Fork of South Platte River at Grant, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	[a] 7.0	430	D.
February	....	....	[a] 7.0	389	D.
March	....	....	[a] 6.0	369	D.
April	26	5	12.7	756	B.
May	88	22	66.3	4,080	B.
June	88	35	71.7	4,270	B.
July	51	22	38.0	2,340	B.
August	22	14	17.3	1,060	B.
September	15	14	14.2	845	C.
October	18	12	14.0	861	C.
November	....	....	[a] 4.0	238	D.
The period	....	....	....	15,600	

[a] Discharge estimated.

NORTH FORK OF SOUTH PLATTE RIVER AT CASSELLS, COLO.

Location.—At Cassells, in sec. 11, T. 7 S., R. 74 W., in the Pike National Forest. The nearest tributary is a small stream entering from the south, a short distance below.

Records available.—July 4, 1908, to December 31, 1911.

Drainage area.—128 square miles (measured from topographic sheets and Forest atlas).

Gage.—Chain gage which replaced a vertical staff reading to the same datum.

Channel.—Shifting.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—There are no court decrees for diversions between this station and that at Grant.

Accuracy.—Although the channel is shifting, sufficient measurements have been obtained to make the estimates of discharge reliable. The diurnal fluctuations due to melting during the day and freezing at night are so great at this station during the spring and, to a less extent, in the fall, that the mean of two dailygage readings does not properly represent the mean stage.

Cooperation.—Station maintained in cooperation with the United States Forest Service and the State engineer.

Discharge measurements of North Fork of South Platte River at Cassells, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 8[a]	R. H. Fletcher	2.08	21.4	June 10	J. B. Stewart	2.19	250
9[a]	.....do	1.84	23.2	July 12	W. B. Freeman	1.82	178
Feb. 20[a]	.....do	1.34	25.2	Aug. 28	R. H. Fletcher	1.33	66.7
Mar. 13[a]	.....do	1.16	22.1	Sept. 8	.....do	1.22	60.3
14[a]	.....do	1.16	23.5	8	Waha & Fletcher	1.22	52.6
Apr. 13	W. B. Freeman	1.20	26.1	Nov. 1	G. H. Russell	1.25	39.6
22	O. M. Wimmer	1.34	44.1				

[a] Ice conditions.

Daily gage height, in feet, of North Fork of South Platte River at Cassells, Colo., for 1911.

[Lulu Cassell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.5	1.15	1.22	1.15	1.48	2.25	1.7	....	1.19	1.45	1.15	2.0
2	1.6	.95	1.18	1.12	1.51	2.28	2.18	....	1.21	1.32	1.15	2.0
3	1.5	.90	1.15	1.15	1.52	2.38	2.62	....	1.2	1.21	1.17	1.95
4	1.9	1.1	1.2	1.15	1.55	2.1	2.45	1.43	1.19	1.2	1.12	1.8
5	1.6	1.05	1.15	1.08	1.6	2.2	2.73	1.45	1.18	1.54	1.24	1.75
6	1.8	.95	1.15	1.18	1.77	2.22	2.3	1.45	1.2	1.35	1.2	1.55
7	1.8	1.05	1.05	1.08	1.75	2.35	2.12	....	1.2	1.25	1.45	1.6
8	1.95	1.1	1.06	1.1	1.82	2.32	2.05	....	1.2	1.3	1.5	1.5
9	1.8	1.05	1.2	1.15	1.9	2.3	1.92	1.7	1.2	1.2	1.4	1.7
10	1.65	.95	1.1	1.1	1.9	2.2	1.88	1.7	1.2	1.19	1.25	1.65
11	2.0	.95	1.05	1.2	1.8	2.25	1.9	1.82	1.2	1.15	1.3	1.7
12	1.55	1.02	1.08	1.08	2.1	2.15	1.85	1.82	1.2	1.16	1.5	1.75
13	1.55	1.05	1.11	1.05	2.12	2.15	1.83	1.42	1.2	1.18	1.55	1.95
14	1.5	1.2	1.23	.96	2.1	2.08	1.83	1.43	1.22	1.15	1.5	1.98
15	1.6	1.1	1.06	.95	2.1	2.1	1.82	1.34	1.28	1.08	1.05	2.02
16	1.75	1.1	1.14	1.05	2.2	2.08	1.8	1.35	1.2	1.18	1.15	1.98
17	1.5	1.05	1.05	1.02	2.35	2.08	1.85	1.34	1.2	1.12	1.4	1.95
18	1.45	1.0	1.0	1.05	2.45	2.05	1.78	1.38	1.18	1.1	1.4	2.0
19	1.5	1.1	1.02	1.12	2.1	2.08	1.78	1.37	1.18	1.2	1.45	1.95
20	1.55	.90	1.08	1.35	1.8	2.11	1.69	1.38	1.19	1.15	1.5	2.08
21	1.35	.80	1.0	1.38	1.88	2.2	1.66	1.39	1.18	1.11	1.4	2.2
22	1.25	.90	1.0	1.36	1.86	2.25	1.72	1.41	1.19	1.1	1.3	1.9
23	1.28	1.1	1.04	1.45	1.9	2.1	1.65	1.4	1.2	1.2	1.7	1.7
24	1.18	.90	1.02	1.4	1.82	2.0	....	1.37	1.18	1.18	1.8	1.2
25	1.28	1.02	1.0	1.35	1.78	1.9	....	1.35	1.18	1.15	1.8	1.2
26	1.28	1.08	.95	1.43	1.94	1.98	....	1.28	1.17	1.18	1.8	1.2
27	1.22	1.1	1.12	1.49	1.88	1.94	....	....	1.17	1.04	2.05	1.2
28	1.25	1.65	1.0	1.5	1.88	1.8	....	1.32	1.16	1.1	2.0	1.15
29	1.3	....	1.0	1.5	2.0	1.75	....	1.27	1.28	1.15	2.05	1.15
30	1.22	....	1.02	1.35	1.80	1.68	....	1.24	1.35	1.18	2.0	1.2
31	1.15	....	1.05	....	2.05	....	....	1.22	....	1.2	....	1.1

NOTE.—Ice present Jan. 1 to Mar. 16 and Nov. 5 to Dec. 31.

Daily discharge, in second-feet, of North Fork of South Platte River at Cassells, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	20	22	65	271	106	97	51	89
2	20	20	70	282	255	93	53	68
3	20	22	72	324	470	89	52	53
4	20	22	77	217	380	85	51	52
5	20	17	86	252	555	89	50	107
6	20	25	122	260	325	89	52	72
7	20	17	118	311	260	107	52	58
8	20	18	134	298	230	126	52	65
9	20	22	155	290	200	145	52	52
10	20	18	155	252	190	145	52	51
11	15	27	129	271	195	178	52	40
12	17	17	217	234	180	102	52	40
13	19	15	224	234	181	84	52	40
14	30	10	217	211	181	85	55	35
15	16	10	217	217	178	71	62	30
16	22	15	252	211	172	72	52	33
17	15	13	311	211	187	71	52	27
18	12	15	356	201	167	77	50	25
19	13	20	217	211	167	76	50	35
20	17	45	129	220	142	77	51	30
21	12	49	150	252	135	78	50	26
22	12	46	145	271	150	82	51	25
23	14	60	155	217	132	80	52	35
24	13	52	134	185	129	76	50	33
25	12	45	124	155	125	72	50	30
26	10	57	167	179	121	62	48	33
27	20	66	150	167	117	65	48	20
28	12	68	150	129	113	68	47	25
29	12	68	185	118	109	61	62	30
30	13	45	152	102	105	57	72	33
31	15		201		101	55		35

NOTE.—Daily discharge determined as follows: Mar. 1 to 10, estimated; Mar. 11 to July 1, from a fairly well defined curve; July 2 to 12, by the indirect method for shifting channels; July 13 to Oct. 10, from a fairly well defined curve; Oct. 11 to 31, by the indirect method for shifting channels.

Monthly discharge of North Fork of South Platte River at Cassells, Colo., for 1911.

[Drainage area, 128 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a] 24	0.188	0.22	1,480	D.
February			[a] 25	.195	.20	1,390	D.
March	30	10	16.8	.131	.15	1,030	C.
April	68	10	31.5	.246	.27	1,870	B.
May	356	65	162	1.27	1.46	9,960	C.
June	324	102	225	1.76	1.96	13,400	B.
July	555	101	195	1.52	1.75	12,000	C.
August	178	55	87.5	.684	.79	5,380	B.
September	72	47	52.5	.410	.46	3,120	B.
October	107	20	42.8	.334	.39	2,630	C.
November			[a] 25	.195	.22	1,490	D.
The period						53,800	

[a] Estimated from discharge measurements.

GENEVA CREEK ABOVE JACKWHACKER CREEK, NEAR GRANT, COLO.

Location.—In Pike National Forest, 100 feet above Jackwhacker Creek and 12 miles above Grant.

Records available.—Fragmentary records August 17, 1909, to November 9, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff; datum unchanged.

Channel.—Character not determined.

Discharge measurements.—Made by wading.

Winter flow.—No data.

Diversions.—No water is diverted above the station.

Accuracy.—Data too meager for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Daily gage height, in feet, of Geneva Creek above Jackwhacker Creek, near Grant, Colo., for 1911.

[Edmund Couch, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1							16						
2				0.54			17			0.55		0.50	
3						0.45	18						
4							19						
5			0.55				20						
6							21						
7					0.50		22				0.48		
8							23						
9			.54			.43	24			.55			
10							25						
11							26						
12					.50		27	0.85					
13		0.90					28						
14							29		0.07				
15				.50			30						

GENEVA CREEK AT OLD GENEVA SMELTER, NEAR GRANT, COLO.

Location.—One-fourth mile below Old Geneva smelter, in T. 6 S., R. 75 W., 10 miles above Grant.

Records available.—Fragmentary records from August 17, 1909, to September 2, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff; datum unchanged.

Channel.—Unstable, as the flow is frequently affected by backwater from beaver dams.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—No water is diverted above the station, and therefore the records represent the natural run-off.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by W. B. Freeman:

July 13, 1911; Gage height, 1.55 feet; discharge, 36 second-feet.

Daily gage height, in feet, of Geneva Creek at Old Geneva smelter, near Grant, Colo., for 1911.

[Edmund Couch, observer.]

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1					16				
2	2.2			1.2	17			1.2	
3					18				
4					19				
5			1.2		20				
6					21				
7					22				
8					23				
9			1.2		24			1.2	
10					25				
11					26				
12					27	1.8			
13		1.55			28				
14					29		1.2		
15					30				

GENEVA CREEK AT SULLIVAN'S RANCH, NEAR GRANT, COLO.

Location.—In Pike National Forest in sec. 29, T. 6 S., R. 74 W., 4 miles above Grant, at Sullivan's ranch; 40 feet below the mouth of Threemile Creek.

Records available.—July 5, 1908, to November 3, 1911.

Drainage area.—66 square miles (measured from Forest atlas).

Gage.—Vertical staff; datum unchanged.

Channel.—Fairly permanent except during high water.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no court decrees for diversion of water above this station, and therefore the records probably represent the natural run-off.

Accuracy.—Conditions are favorable for good results, and the estimates of discharge should be reliable. The stream is, however, subject to sharp diurnal fluctuations, especially in the spring and, to a less extent, in the fall, caused by melting during the day and freezing at night, so that the mean gage height derived from two daily readings may not represent the true stage.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Geneva Creek at Sullivan's ranch, near Grant, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 9[a]	Fletcher and Couch	0.50	14.6	June 11	J. B. Stewart	1.60	182
Feb. 21[a]	R. H. Fletcher	.40	15.3	July 13	W. B. Freeman	1.40	143
Mar. 14[a]	do	.48	13.7	Aug. 29	R. H. Fletcher	.80	40.6
Apr. 14	W. B. Freeman	.47	14.3	Nov. 2	G. H. Russell	.72	26.3

[a] Ice conditions.

Daily gage height, in feet, of Geneva Creek at Sullivan's ranch, near Grant, Colo., for 1911.

[Mrs. M. A. Sullivan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1				0.50	0.70	1.70	1.25	1.00	0.75	1.00	
2				.50	.68	1.60	1.80	1.00	.78	.90	0.72
3				.50	.65	1.55	1.90	1.00	.80	.75	.80
4					.70	1.65	1.75	1.00	.85	.70	
5				.45	.95	1.65	1.95	.90	.80	.90	
6					.95	1.60	1.90	.90	.80	.80	
7				.45	1.10	1.70	1.85	.90	.75	.75	
8				.45	1.20	1.70	1.70	.90	.75	.75	
9	0.50			.45	1.35	1.68	1.55	.90	.75	.80	
10				.50	1.10	1.68	1.45	.90	.75	.70	
11				.50	.95	1.62	1.45	1.00	.75	.70	
12					1.08	1.65	1.40	1.00	.72	.70	
13				.50	1.20	1.55	1.35	.90	.70	.70	
14			0.48	.50	1.25	1.60	1.30	.88	.75	.70	
15				.65	1.25	1.55	1.30	.85	.80	.70	
16				.58	1.35	1.55	1.30	.90	.70	.70	
17				.50	1.40	1.55	1.40	.88	.70	.70	
18				.50	1.55	1.58	1.30	.90	.70	.70	
19				.62	1.45	1.55	1.30	.90	.70		
20				.64	1.30	1.55	1.30	.88	.75		
21		0.40		.70	1.28	1.65	1.20	.90	.75		
22			.40	.68	1.25	1.78	1.28	.95	.72		
23			.40	.70	1.28	1.72	1.20	1.00	.70		
24				.60	1.35	1.60	1.20	.90	.70		
25			.40	.65	1.35	1.50	1.15	.90	.70		
26			.40	.68	1.38	1.45	1.15	.80	.70		
27				.80	1.45	1.45	1.10	.80	.70		
28				.80	1.40	1.40	1.15	.80	.70		
29			.40	.82	1.50	1.30	1.10	.80	.80	.75	
30				.75	1.45	1.30	1.05	.78	.85	.75	
31			.45		1.50		1.00	.75		.75	

NOTE.—Ice present Jan. 1 to about Mar. 21.

Daily discharge, in second-feet, of Geneva Creek at Sullivan's ranch, near Grant, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		15	33	226	117	66	32	66	30
2		15	31	202	239	66	36	51	29
3		15	28	190	263	66	38	32	38
4		14	33	214	227	66	44	27	
5		12	67	214	276	51	38	51	
6		12	67	202	263	51	38	38	
7		12	94	226	251	51	32	32	
8		12	114	226	216	51	32	32	
9		12	145	221	182	51	32	38	
10		15	94	221	159	51	32	27	
11		15	67	207	159	66	32	27	
12		15	90	214	148	66	29	27	
13		15	114	190	137	51	27	27	
14	14	15	124	202	122	48	32	27	
15		28	124	190	122	44	38	27	
16		21	145	190	122	51	27	27	
17		15	156	187	143	48	27	27	
18		15	190	193	122	51	27	27	
19		25	167	187	122	51	27	28	
20		27	134	187	122	48	32	28	
21		33	130	210	102	51	32	28	
22	8.0	31	124	232	118	58	29	29	
23	8.0	33	130	226	102	66	27	29	
24	8.0	23	145	198	102	51	27	29	
25	8.0	28	145	176	92	51	27	30	
26	8.0	31	152	164	92	38	27	30	
27	8.0	45	167	164	83	38	27	31	
28	8.0	45	156	153	92	38	27	31	
29	8.0	48	178	126	83	38	38	32	
30	10	39	167	126	74	36	44	32	
31	12		178		66	32		32	

NOTE.—Daily discharge determined as follows: Mar. 22 to June 11 and July 14 to Nov. 3, from two fairly well-defined curves; June 12 to July 13, by indirect method for shifting channels; discharge interpolated Oct. 19 to 28.

Monthly discharge of Geneva Creek at Sullivan's ranch, near Grant, Colo., for 1911.

[Drainage area, 66 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January			[a] 15	0.227	0.26	922
February			[a] 15	.227	.24	833
March			11.7	.177	.20	719
April	48	12	22.7	.344	.38	1,350
May	190	28	119	1.80	2.08	7,320
June	232	126	195	2.95	3.29	11,600
July	276	66	146	2.21	2.55	8,980
August	66	32	51.3	.777	.90	3,150
September	44	27	31.9	.483	.54	1,900
October	66	27	32.2	.488	.56	1,980
November			[a] 20	.303	.34	1,190
December						
The period						39,900

[a] Estimated.

NOTE.—Discharge estimated at 14 second-feet Mar. 1-13 and 11 second-feet Mar. 15-21.

GENEVA CREEK AT GRANT, COLO.

Location.—In the Pike National Forest, at highway bridge in sec. 9, T. 7 S., R. 74 W., at Grant post office; 300 feet above mouth of creek.

Records available.—November 3 to December 31, 1911.

Drainage area.—74 square miles (measured from Forest Atlas).

Gage.—Vertical staff.

Channel.—Somewhat shifting during high water.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no court decrees for diversions above this station.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by G. H. Russell:

November 3, 1911: Gage height, 0.96 foot; discharge, 12 second-feet.

Daily gage height, in feet, of Geneva Creek at Grant, Colo., for 1911.

[Edmund Couch, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1			11		1.60	21		1.70
2			12			22		1.70
3	0.96		13		1.75	23		
4		1.45	14		1.70	24		
5			15		1.65	25		
6			16		1.65	26		
7			17	1.25		27		
8		1.45	18			28		
9			19			29		
10			20		1.70	30		
						31		

NOTE.—Ice present Nov. 16 to Dec. 31; ice 10 inches thick Dec. 11 and 14 inches thick Dec. 20, 21, and 22.

SMELTER CREEK NEAR GRANT, COLO.

Location.—In Pike National Forest, at Old Geneva smelter, in T. 6 S., R. 75 W., 10 miles above Grant; one-fourth mile above the mouth of creek.

Records available.—Fragmentary records August 17, 1909, to November 9, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff whose datum has remained unchanged.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months, and the records are discontinued.

Diversions.—There are no court decrees for diversions above this station and therefore the records probably represent the natural run-off.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Smelter Creek near Grant, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 13	W. B. Freeman	0.90	12.7
Nov. 2	G. H. Russell	.52	1.4

Daily gage height, in feet, of Smelter Creek near Grant, Colo., for 1911.

[Edmund Couch, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1							16						
2	1.06			0.62			17			0.60		1.54	
3						0.50	18						
4							19						
5			0.65				20						
6							21						
7					1.54		22				0.50		
8							23						
9			.63			.45	24			.60			
10							25						
11							26						
12					1.55		27	0.95					
13		0.90					28						
14							29						
15				.55			30		0.07				
							31						

DUCK LAKE CREEK NEAR GRANT, COLO.

Location.—At Gordon's ranch, in sec. 12, T. 6 S., R. 75 W., 50 yards above the mouth, 7 miles above Grant, in Pike National Forest.

Records available.—Fragmentary records August 17, 1909, to November 9, 1911.

Drainage area.—8 square miles (measured from topographic sheet).

Gage.—Vertical staff; datum unchanged.

Channel.—Data too meager to determine.

Discharge measurements.—Made from footbridge or by wading.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—There are no court decrees for diversions above this station and therefore the records probably represent the natural run-off.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by G. H. Russell:

November 2, 1911: Gage height, 0.88 foot; discharge, 1.3 second-feet.

Daily gage height, in feet, of Duck Lake Creek near Grant, Colo., for 1911.

[Edmund Couch, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1								16							
2		1.55			0.95			17				0.95		0.87	
3							0.95	18							
4								19	1.40						
5				1.00				20							
6								21							
7						0.82		22					0.80		
8								23		1.45					
9				.95			.87	24				.95			
10		1.55		.95				25							
11	0.95							26							
12						.90		27		1.30					
13			1.30					28							
14								29			1.05				
15					.80			30							
								31							

SCOTT GOMER CREEK[1] NEAR GRANT, COLO.

Location.—Near Sullivan's ranch, in sec. 19, T. 6 S., R. 74 W., in the Pike National Forest, about 5 miles above Grant, one-fourth mile above mouth of creek. No tributary enters between mouth and station.

Records available.—Fragmentary records August 16, 1909, to December 31, 1911.

Drainage area.—21 square miles (measured from topographic sheet).

Gage.—Vertical staff, moved to its present location, 2¼ miles below original site, September 4, 1909. Datum unchanged in new location, but has no determined relation to datum of original gage.

Channel.—Slightly shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no court decrees for diversions above this station, and therefore the records probably represent the natural run-off.

Accuracy.—Conditions are favorable for fairly accurate results and the estimates of flow should be reliable.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Scott Gomer Creek near Grant, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 9[a]	Fletcher and Couch	1.10	4.7	June 11	J. B. Stewart	2.45	31.4
Feb. 21[a]	R. H. Fletcher	.90	4.8	July 13	W. B. Freeman	2.53	40.7
Mar. 14[a]	do	1.10	5.9	Aug. 29	R. H. Fletcher	1.68	12.9
Apr. 14[a]	W. B. Freeman	1.26	3.2	Nov. 2	G. H. Russell	1.00	9.6
21	O. M. Wimmer	1.20	7.3				

[a] Ice conditions.

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[1] Also called East Geneva Creek.

Daily gage height, in feet, of Scott Gomer Creek near Grant, Colo., for 1911.

[Edmund Couch, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2					1.30	3.15			1.65		1.60	1.30
3											1.65	
4				0.95								1.30
5								1.80				
6												
7		0.70							1.65	1.65		
8							2.80					
9	0.70							1.67			1.55	
10		.70				3.55		1.67				
11					2.60	2.45						1.30
12										1.65		
13							2.54					
14	.75		1.10	1.26								
15				1.00					1.65			
16						2.55		1.70				
17								1.70		1.60	1.40	
18												
19					3.00							
20				1.10								1.35
21		.90		1.20								
22									1.60			
23						2.95						
24			1.00					1.77				
25											1.35	
26					3.00							
27						2.85						
28				1.30								
29							1.95	1.68				
30												
31												

NOTE.—Ice caused backwater Jan. 1 to Apr. 14 and Nov. 17 to Dec. 31.

Daily discharge, in second-feet, of Scott Gomer Creek near Grant, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		7.5	70	53	16	11	11	10
2		7.5	72	53	16	11	11	10
3		11	75	52	15	11	11	11
4		14	78	52	14	11	11	11
5		17	81	52	14	11	11	11
6		21	84	51	13	11	11	10
7		25	88	51	12	11	11	10
8		29	92	51	11	11	11	10
9		33	96	48	11	11	11	10
10		37	100	45	11	11	11	
11		41	34	42	11	11	11	
12		43	35	40	11	11	11	
13		46	36	38	12	11	11	
14		49	37	36	12	11	11	
15	5	52	38	34	12	11	10	
16	5	55	38	32	12	11	10	
17	5	58	41	30	12	11	10	
18	5.5	61	44	29	12	11	10	
19	5.5	63	47	28	12	10	10	
20	5.5	63	50	27	12	10	10	
21	6.5	63	53	26	13	10	10	
22	6.5	63	56	25	13	10	10	
23	6.5	63	60	24	13	10	10	
24	7.0	63	58	23	13	10	10	
25	7.0	63	56	22	12	10	10	
27	7.5	63	55	21	12	10	10	
26	7.5	64	54	20	11	10	10	
28	7.5	65	54	19	11	10	10	
29	7.5	66	54	18	11	10	10	
30	7.5	67	53	18	11	11	10	
31		68		17	11		10	

NOTE.—Daily discharge determined from a rating curve that is fairly well defined between 5 and 36 second-feet. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Scott Gomer Creek near Grant, Colo., for 1911.

[Drainage area, 21 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a] 5.0	0.238	0.27	307	
February			[a] 5.0	.238	.25	278	
March			[a] 5.0	.238	.27	307	
April	7.5		5.75	.274	.31	342	C.
May	68	7.5	46.5	2.21	2.55	2,960	C.
June	100	34	59.6	2.84	3.17	3,550	C.
July	53	17	34.7	1.65	1.90	2,130	C.
August	16	11	12.3	.586	.68	756	C.
September	11	10	10.6	.505	.56	631	C.
October	11	10	10.5	.500	.58	646	C.
November	11		[a] 8.0	.381	.43	476	C.
December			[a] 5.0	.238	.27	307	
The year	100		17.4	.829	11.24	12,600	

[a] Estimated.

NOTE.—Discharge Apr. 1 to 14 estimated at 5 second-feet per day. Nov. 10 to 30 at 7 second-feet.

CLEAR CREEK AT IDAHO SPRINGS, COLO.

Location.—At Idaho Springs, in sec. 36, T. 3 S., R. 73 W., half a mile below mouth of Chicago Creek and a quarter of a mile above entrance of Soda Creek and Virginia Canyon.

Records available.—October 8, 1910, to December 31, 1911.

Drainage area.—239 square miles (measured from Forest Atlas).

Gage.—A staff gage placed March 23, 1911, a short distance upstream from the original staff gage, which was used until that date. The new gage was referred to a datum 0.2 foot lower than the original. All readings have been referred to the latter gage.

Channel.—Slightly shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no court decrees for diversions above the station, but the records do not represent the natural flow at all times, as water is diverted from Fraser River, in the Grand Basin, into Clear Creek by means of a tunnel and canal entering the West Fork. This diversion has a court decree for 53 second-feet.

Accuracy.—Conditions are favorable for fairly accurate results.

Artificial control.—The operation of two power plants some 12 miles above the station causes a daily fluctuation of 0.10 foot or more at the gage during the low-water period.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Clear Creek at Idaho Springs, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 23	Fletcher and Miles	0.50	34.5	Sept. 22	G. A. Gray	0.98	119
Apr. 27	O. M. Wimmer	.82	74.8	Nov. 8[a]	G. H. Russell	.80	63.4
June 29	E. O. Christiansen	2.70	508	Dec. 21[b]	R. H. Fletcher	.80	49.6
Aug. 12	R. H. Fletcher	1.60	241				

[a] Slight ice effect.

[b] Ice conditions.

Daily gage height, in feet, of Clear Creek at Idaho Springs, Colo., for 1911.

[W. B. Kelso, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.55			0.7	2.15	2.15					0.8
2						2.3		1.35		0.7	0 75	
3						2.3		1.3				
4							2.65				.7	.6
5				0.6		2.5	3.3	1.2	0.95	.9	.65	
6					1.1	2.5	3.35			.9		
7						2.7	3.15			1.0		
8			0.8		1.3	2.8	3.0	1.1			.8	.6
9					1.3	3.0		1.1				
10					1.4	2.75	2.5			.8	.6	
11		.55							.75	.85	.7	
12		.55			1.7	2.9						
13					1.3	2.95		1.1	.8		.7	
14							2.3	1.1		.7		
15				.7	1.3	2.8	2.2	1.05				
16					1.4			1.1	.7	.6		.6
17					1.45	2.6		1.1	.55	.6	1.1	
18					1.6						1.1	.55
19	0.55					2.6	2.15	1.0	.8			.75
20			.55	.6	1.5							
21		.7					1.9	1.2				.8
22					1.4				1.0		.6	
23	.55		.5			2.8			.6	.65	.5	
24			.6		1.5	2.7	1.75	1.1				
25							1.7		.6	.65		
26				.75								
27				.8		2.3						
28						2.2		1.0	.55			
29					1.8	2.3	1.5					
30	.6		.55		1.9			.95	.65			1.0
31					2.0			.95				

NOTE.—Gage heights during January, February, and to Mar. 8 distorted by ice; ice from Nov. 17 to Dec. 31.

Daily discharge, in second-feet, of Clear Creek at Idaho Springs, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			61	372	372				
2				410		182		61	69
3				410		171			
4					498				61
5		46		460	665	151	703	94	54
6			131	460	680			94	
7				510	622			112	
8			171	535	585	131			77
9			171	585		131			
10			192	522	460			77	46
11							69	86	61
12			260	560					
13			171	572		131	77		61
14					410	131		61	
15		61	171	535	385	122			
16			192			131	61	46	
17			202	485		131	40	46	
18			235						
19				485	372	112	77		
20	40	46	213						
21					310	151			
22			192				112		
23	33			535			46	54	
24	46		213	510	272	131			
25					260		46	54	
26		69							
27		77		410					
28				385		112	40		
29			285	410	213				
30	40		310			103	54		
31			335			103			

CLEAR CREEK AT FORKSCREEK, COLO.

Location.—At Forkscreek, a few hundred feet below the mouth of North Clear Creek,

Records available.—May 29, 1899, to December 31, 1911.

Drainage area.—345 square miles.

Gage.—A chain gage was installed June 3, 1907, 50 feet upstream from first site. The original gage had been moved 30 feet upstream on July 19, 1905, but set to read the same as before. The chain gage was also referred to the same datum.

Channel.—Very shifting.

Discharge measurements.—Made from footbridge and by wading.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—There are no court decrees for diversions between Idaho Springs and Forkscreek. Below there are decrees for diversions of 1,668 second-feet from Clear Creek.

Artificial control.—The natural flow is regulated to some extent by storage in various ponds and reservoirs above.

Accuracy.—Estimates have been made by the indirect method for shifting channels and can be considered in general only fair although the 1911 estimates have been rated as good.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Clear Creek at Forkscreek, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 3[a]	Miles and Fletcher	7.37	22.6	June 29	E. O. Christiansen	7.00	537
Mar. 1[a]	R. H. Fletcher	6.73	24.4	Aug. 12	R. H. Fletcher	6.10	274
1[a]	do	7.33	28.4	Sept. 23	G. A. Gray	5.62	86.2
24	do	5.98	41.2	Nov. 8	G. H. Russell	5.80	81.3
24	Miles and Fletcher	5.94	32.1	Dec. 22	R. H. Fletcher	[b] 7.40	40.7
May 13	J. B. Stewart	6.70	286				

[a] Ice conditions. [b] Gage height distorted by ice. Reading to top of ice.

Daily gage height, in feet, of Clear Creek at Forkscreek, Colo., for 1911.

[C. W. Haisington, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		6.2	7.8	6.15	6.25	7.3	6.8	6.2	5.7	5.75	5.7	5.65
2		6.15	7.75	6.1	6.2	7.4	7.45	6.1	5.7	5.6	5.7	5.65
3		6.1	7.75	6.05	6.2	7.55	7.65	6.1	5.95	5.6	5.7	5.3
4	7.85	6.15	7.6	6.05	6.3	7.65	7.65	6.0	5.85	5.6	5.7	5.3
5	7.8	6.15	7.5	6.15	6.3	7.55	7.6	6.0	5.7	5.6	5.65	5.4
6	7.55	6.2	7.45	6.1	6.45	7.55	7.7	5.9	5.7	5.6	5.7	5.55
7	7.55	6.2	7.3	6.05	6.7	7.45	7.45	5.9	5.65	5.6	5.7	5.7
8	7.65	6.05	7.3	6.0	6.7	7.45	7.25	5.85	5.65	5.65	5.8	5.75
9	7.6	6.0	6.9	6.1	6.8	7.4	7.15	5.85	5.65	5.65	5.8	5.95
10	7.4	6.3	6.9	6.05	6.9	7.4	7.0	6.0	5.6	5.6	5.8	5.95
11	7.5	6.35	6.3	6.1	6.75	7.3	6.9	6.1	5.6	5.65	5.6	5.95
12	7.3	6.45	6.25	6.1	6.6	7.45	6.9	6.1	5.6	5.65	5.5	6.4
13	7.55	6.35	6.25	6.1	6.7	7.5	6.85	6.1	5.6	5.7	5.65	6.5
14	6.95	6.35	5.9	6.0	6.7	7.5	6.7	6.1	5.6	5.7	5.65	6.6
15	6.45	6.25	5.8	5.9	6.8	7.45	6.7	6.0	5.6	5.7	5.7	6.7
16	6.35	6.25	5.8	6.0	6.8	7.35	6.6	6.0	5.6	5.5	5.6	6.7
17	6.4	6.25	5.8	6.0	6.9	7.2	6.55	6.0	5.6	5.6	5.7	6.85
18	6.35	6.45	5.85	6.05	6.9	7.1	6.55	6.0	5.6	5.6	5.6	6.9
19	6.35	6.4	5.95	6.1	7.0	7.15	6.55	5.95	5.6	5.65	5.6	6.9
20	6.25	6.8	6.0	6.1	6.85	7.3	6.55	5.9	5.6	5.7	5.7	7.0
21	6.35	6.85	5.85	6.1	6.8	7.55	6.5	5.9	5.6	5.7	5.7	7.1
22	6.55	6.85	6.15	6.2	6.7	7.6	6.5	5.9	5.6	5.65	5.7	7.1
23	6.85	7.1	6.05	6.2	6.6	7.4	6.5	5.9	5.6	5.65	5.7	7.1
24	6.6	7.1	6.0	6.2	6.7	7.3	6.5	5.85	5.6	5.65	5.65	7.0
25	6.4	7.25	6.05	6.2	6.8	7.2	6.45	5.85	5.6	5.65	5.55	7.0
26	6.25	7.7	5.9	6.3	6.9	7.1	6.4	5.8	5.6	5.7	5.65	7.1
27	6.2	7.85	5.8	6.35	6.9	7.0	6.4	5.8	5.6	5.7	5.7	7.2
28	6.15	7.85	6.05	6.4	7.0	7.0	6.4	5.8	5.6	5.7	5.7	7.2
29	6.1		6.1	6.5	7.05	6.9	6.3	5.75	5.6	5.7	5.65	7.1
30	6.05		6.15	6.3	7.1	6.85	6.3	5.75	5.6	5.6	5.65	7.1
31	6.15		6.15		7.1		6.2	5.7		5.7		

Note.—Ice present Jan. 1 to Mar. 13 and Dec. 7 to 31.

Daily discharge, in second-feet, of Clear Creek at Forkscreek, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	23	24	26	83	110	670	432	255	128	103	67	55
2	23	24	26	70	96	738	833	216	128	76	67	55
3	23	24	26	58	96	825	965	220	215	76	67	27
4	23	24	26	58	125	882	970	185	177	76	67	27
5	23	24	26	83	125	835	945	181	160	73	57	33
6	23	24	26	70	179	837	1,010	155	160	73	65	45
7	23	24	26	58	286	780	860	158	112	73	65	45
8	23	24	26	47	286	782	740	143	112	80	81	45
9	23	24	28	70	332	750	680	146	112	80	81	45
10	23	24	28	58	386	752	595	202	97	68	81	45
11	23	24	28	70	309	690	540	242	97	78	50	45
12	23	24	28	70	240	784	545	245	96	78	40	45
13	23	24	28	70	286	814	515	248	95	84	55	45
14	23	24	30	47	286	820	435	252	94	84	55	41
15	23	25	18	30	338	790	442	217	93	84	63	41
16	23	25	18	47	340	730	390	219	92	58	50	41
17	23	25	18	47	397	640	365	221	91	64	63	41
18	23	25	24	58	400	580	373	223	90	64	50	41
19	23	25	38	70	460	610	375	205	88	69	50	41
20	23	25	47	70	375	708	378	188	87	80	63	41
21	23	25	24	70	355	865	357	191	85	80	63	41
22	23	25	83	96	306	900	363	193	83	79	63	41
23	23	25	58	96	260	770	367	195	80	67	63	41
24	23	25	47	96	305	712	370	175	80	67	55	41
25	23	25	58	96	360	652	350	175	79	67	45	41
26	23	25	30	125	420	590	327	160	78	70	55	41
27	23	25	18	138	422	533	330	160	78	70	63	35
28	23	25	58	160	480	535	333	160	78	69	63	35
29	23	......	70	198	510	480	290	143	77	69	55	35
30	23	......	83	125	545	455	292	143	77	52	55	35
31	23	......	83	......	545	......	252	127	......	67	......	35

NOTE.—Daily discharge estimated, because of ice, Jan. 1 to Mar. 13 and Dec. 7 to 31; discharge Mar. 14 to May 13 determined from a rating curve fairly well defined between 30 and 450 second-feet; discharge May 14 to Dec. 6 computed by indirect method for shifting channels.

Monthly discharge of Clear Creek at Forkscreek, Colo., for 1911.

[Drainage area, 345 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	23	23	23	1,410	B.
February	25	24	24.4	1,360	B.
March	83	18	37.2	2,290	B.
April	198	30	81.1	4,830	A.
May	545	96	321	19,800	B.
June	900	455	717	42,700	B.
July	1,010	252	517	31,800	B.
August	255	127	192	11,800	B.
September	215	77	104	6,170	B.
October	103	52	73.5	4,520	B.
November	81	40	60.6	3,600	B.
December	55	27	40.8	2,510	B.
The year	1,010	18	183	133,000	

ST. VRAIN CREEK AT LYONS, COLO.

Location.—Three-fourths of a mile below Lyons, in sec. 17, T. 3 N., R. 70 W., one fourth mile below the junction of North and South St. Vrain creeks and just below Stone Canyon.

Records available.—August 1, 1887, to October 31, 1890; June 13, 1895, to October 31, 1903; July 1, 1904, to December 31, 1911.

Drainage area.—209 square miles.

Gage.—Inclined staff gage installed August 9, 1909, at practically the same datum as the inclined staff gage used from 1895 to 1903. It is not known whether the gage used prior to 1895 was located at the present site.

Channel.—Character not known, as only computed records are received.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during a portion of the winter months.

Diversions.—There are court decrees for the diversion of 166 second-feet from the St. Vrain and tributaries above the station. Below there are court decrees for 1,632 second-feet from St. Vrain Creek and flood-water diversions of 190,000 acre-feet.

Cooperation.—From 1887 to 1890 and from July 1, 1904, to 1911 the station was maintained by the State engineer, by whom the records have been furnished.

Discharge measurements of St. Vrain Creek at Lyons, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 9	C. E. Turner	1.45	1.5	July 31	C. C. Hezmalhalch	2.70	151
Mar. 9	.....do	1.93	24.1	Aug. 21	.....do	2.43	82.4
Apr. 12	.....do	1.98	28.6	Sept. 14	Grieve and Hezmalhalch	2.34	70.0
28	.....do	2.28	67.6	Oct. 16	C. E. Turner	2.15	43.6
May 18	.....do	3.12	249	Dec. 15	.....do	1.77	10.2
26	Thos. Grieve	3.15	247				

Daily gage height, in feet, of St. Vrain Creek at Lyons, Colo., for 1911.

[Lloyd Hess, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.7	1.85	1.7	2.0	2.4	3.5	3.3	2.6	2.3	2.4	1.95	1.85
2	......	1.8	1.85	2.05	2.45	3.5	3.5	2.6	2.3	2.4	1.95	1.85
3	......	1.8	1.8	2.1	2.55	3.5	3.6	2.8	2.6	2.2	2.0	1.9
4	......	1.7	1.8	2.05	2.5	3.55	3.6	2.7	2.6	2.2	2.0	1.85
5	1.8	......	1.85	2.1	2.5	3.6	3.45	2.7	2.5	2.2	2.0	1.9
6	1.8	......	1.9	2.05	2.8	3.6	3.4	2.7	2.5	2.45	2.0	1.8
7	1.8	......	1.9	2.0	2.85	3.6	3.45	2.7	2.5	2.45	2.0	1.75
8	1.8	......	1.85	2.0	3.0	3.7	3.4	2.45	2.45	2.45	2.0	1.7
9	1.8	......	1.9	2.0	3.0	4.0	3.3	2.4	2.3	2.4	2.0	1.65
10	1.8	1.0	1.9	2.1	2.95	3.7	3.1	2.45	2.2	2.3	1.95	1.7
11	1.85	1.8	1.9	2.05	2.85	3.65	3.05	2.5	2.15	2.2	1.75	1.65
12	1.85	1.75	1.85	2.0	2.85	3.7	3.1	2.55	2.25	2.2	1.80	1.65
13	1.85	1.7	1.9	1.95	3.0	3.8	3.05	2.45	2.25	2.2	2.0	1.7
14	1.8	1.7	1.8	1.95	3.0	3.7	3.05	2.45	2.3	2.1	2.0	1.65
15	1.8	1.7	1.9	1.85	3.1	3.8	3.1	2.4	2.35	2.1	2.0	1.7
16	1.75	1.7	1.9	2.05	3.1	3.9	3.05	2.5	2.3	2.1	2.0	1.65
17	1.7	1.75	1.8	2.1	3.1	3.8	3.0	2.4	2.25	2.1	1.70	1.6
18	1.7	1.6	1.85	2.0	3.05	3.5	3.05	2.45	2.2	2.1	1.80	1.6
19	1.7	1.6	1.9	2.05	3.2	3.55	3.1	2.5	2.15	2.1	1.95	1.6
20	1.7	1.6	1.9	2.1	3.1	3.6	3.1	2.45	2.0	2.1	2.0	1.6
21	1.7	1.65	1.9	2.1	3.0	3.8	3.05	2.45	2.0	2.1	1.7	0.0
22	1.75	1.6	2.0	2.2	2.9	4.0	3.05	2.45	2.1	2.1	1.7	0.0
23	1.85	1.75	1.9	2.3	2.9	3.8	3.1	2.6	2.1	2.2	1.6	1.6
24	1.8	1.75	1.9	2.25	3.0	3.6	3.0	2.65	2.1	2.1	.0	1.6
25	1.75	1.8	1.9	2.3	3.05	3.5	2.9	2.6	2.1	2.05	1.7	1.6
26	1.75	1.8	1.85	2.15	3.2	3.45	2.85	2.5	2.05	2.0	1.75	1.6
27	1.7	1.8	1.85	2.1	3.2	3.4	2.9	2.4	2.1	2.0	1.8	1.6
28	1.75	1.7	2.0	2.25	3.15	3.4	2.85	2.4	2.1	1.95	1.8	0.0
29	1.8	......	1.9	2.5	3.15	3.4	2.8	2.35	2.25	2.0	1.75	1.6
30	1.9	......	2.0	2.55	3.25	3.35	2.8	2.35	......	2.0	1.85	1.6
31	1.9	......	2.0	......	3.50	......	2.7	2.4	......	2.0	......	0.0

Daily discharge, in second-feet, of St. Vrain Creek at Lyons, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8	16	8	28	82	372	302	118	66	82	24	16
2	5	13	16	33	90	372	372	118	66	82	24	16
3	5	13	13	38	108	372	410	160	118	52	28	19
4	5	8	13	33	98	391	410	138	118	52	28	16
5	13	2	16	38	98	410	354	138	98	52	28	19
6	13	2	19	33	160	410	336	138	98	90	28	13
7	13	2	19	28	172	410	354	138	98	90	28	10
8	13	2	16	28	210	450	336	90	90	90	28	8
9	13	4	19	28	210	576	302	82	66	82	28	6
10	13	6	19	38	197	450	238	90	52	66	24	8
11	16	13	19	33	172	430	224	98	45	52	10	6
12	16	10	16	28	172	450	238	108	59	52	13	6
13	16	8	19	24	210	490	224	90	59	52	28	8
14	13	8	13	24	210	450	224	90	66	38	28	6
15	13	8	19	16	238	490	238	82	74	38	28	8
16	10	8	19	33	238	532	224	98	66	38	28	6
17	8	10	13	38	238	490	210	82	59	38	8	5
18	8	5	16	28	224	372	224	90	52	38	13	5
19	8	5	19	33	268	391	238	98	45	38	24	5
20	8	5	19	38	238	410	238	90	28	38	28	5
21	8	6	19	38	210	490	224	90	28	38	8	3
22	10	5	28	52	184	576	224	90	38	38	8	3
23	16	10	19	66	184	490	238	118	38	52	5	5
24	13	10	19	59	210	410	210	128	38	38	3	5
25	10	13	19	66	224	372	184	118	38	33	8	5
26	10	13	16	45	268	354	172	98	33	28	10	5
27	8	13	16	38	268	336	184	82	38	28	13	5
28	10	8	28	59	253	336	172	82	38	24	13	3
29	13	......	19	98	253	336	160	74	59	28	10	5
30	19	......	28	108	285	319	160	74	70	28	16	5
31	19	......	28	......	372	......	138	82	......	28	......	3

NOTE.—Daily discharge interpolated for days for which gage heights are missing.

Monthly discharge of St. Vrain Creek at Lyons, Colo., for 1911.

[Drainage area, 209 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	19	5	11	700
February	16	2	8.1	448
March	28	8	18	1,130
April	108	16	42	2,480
May	372	82	205	12,600
June	576	319	425	25,300
July	410	138	250	15,400
August	160	74	102	6,290
September	118	33	61	3,650
October	90	24	49	3,020
November	28	3	19	1,130
December	19	3	7.7	472
The year	576	2	100	72,600

BOULDER CREEK AT ORODELL, COLO.

Location.—At Orodell station in sec. 27, T. 1 N., R. 71 W.; just below mouth of Fourmile Creek.

Records available.—March 18, 1907, to November 30, 1911. From May 14, 1895, to December 20, 1909, a station was maintained about 1 mile below the present site, chiefly by the State engineer. The records at the two points are not directly comparable, as some water is diverted for irrigation between. From 1902 to 1906 the records for the lower station were published only in the reports of the State engineer.

Drainage area.—108 square miles (State engineer's report).

Gage.—Automatic recording gage installed by the Central Colorado Power Co.

Channel.—Not known, as only the computed records are furnished.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during the winter months and during that period discharge measurements are made to determine the flow.

Diversions.—There are no diversions from Boulder Creek above the station but there are court decrees for diversions of 165 second-feet from tributaries entering above. Below the station there are decrees for diversions of 2,871 second-feet from Boulder Creek.

Cooperation.—Station maintained by the State engineer in cooperation with the Central Colorado Power Co., by which the records are furnished.

Discharge measurements of Boulder Creek at Orodell, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 14[a]	C. L. Chatfield	[b] 2.50	2.4	June 1	Thos. Grieve	3.05	220
Feb. 10[a]	C. E. Turner	1.66	5.6	9	C. C. Hezmalhalch	3.42	444
Mar. 5	Chatfield and Turner	[b] 2.48	2.6	Aug. 1	.....do	2.48	83
10	C. E. Turner	[b] 2.66	6.0	22	.....do	2.20	54
Apr. 13	.....do	[b] 2.49	2.7	Sept. 15	Hezmalhalch and Grieve	1.90	26
26	.....do	1.93	32.0	Oct. 17	C. E. Turner	1.68	14.4
May 18	.....do	3.00	206	Dec. 16	.....do	1.92	12.3

[a] Ice conditions. [b] Gage heights to temporary gage datum.

Daily gage heights, in feet, of Boulder Creek at Orodell, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2.71	....	1.40	2.37	3.08	2.82	2.28	2.15	....	1.65
2	....	2.65	....	1.45	2.46	3.15	2.95	2.45	2.10	....	1.65
3	....	2.67	....	1.50	2.42	3.25	3.15	2.40	2.10	....	1.65
4	....	2.70	....	1.60	2.28	3.05	3.20	2.36	2.05	....	1.7
5	....	2.65	1.35	1.50	2.32	3.20	3.25	2.28	2.05	....	1.7
6	....	2.60	1.35	1.80	2.45	3.20	3.20	2.18	2.05	....	1.7
7	....	2.50	1.35	1.45	2.63	3.28	3.28	2.20	2.00	....	1.7
8	....	2.55	1.35	1.45	2.83	3.32	3.20	2.15	2.00	....	1.85
9	....	2.52	1.40	1.55	2.90	3.38	3.13	2.18	2.00	....	1.65
10	....	2.50	1.50	1.60	2.86	....	3.08	2.37	2.00	....	1.8
11	....	2.50	1.50	1.55	2.65	3.37	3.05	2.30	2.00	....	1.6
12	....	2.45	1.40	1.45	2.50	3.40	3.03	2.14	1.95	....	1.6
13	....	2.48	1.35	1.40	....	3.46	2.97	2.23	1.90	....	2.05
14	2.50	2.48	1.35	1.45	....	3.42	2.85	2.28	1.85	....	1.75
15	2.52	2.50	1.40	....	....	3.38	2.87	2.28	1.85	....	1.85
16	2.52	2.52	1.35	....	....	3.40	2.78	2.18	....	....	1.7
17	2.54	2.48	1.40	....	....	....	2.63	2.22	....	1.7	1.75
18	2.56	2.50	1.35	....	....	....	2.69	2.20	....	1.7	1.65
19	2.55	2.45	1.40	....	....	....	2.76	2.15	....	1.65	1.65
20	2.53	2.40	1.40	....	3.02	....	2.65	2.20	....	1.7	1.55
21	2.50	2.60	1.45	....	2.85	....	2.64	2.20	....	1.75	1.6
22	2.50	3.05	1.45	....	2.78	....	2.55	2.20	....	....	1.75
23	2.48	3.10	1.40	1.85	2.69	....	2.55	2.35	....	....	1.7
24	2.50	3.20	1.40	1.76	2.62	....	2.60	2.35	....	....	1.9
25	2.52	3.10	1.45	1.88	2.75	3.30	2.65	2.35	....	....	1.7
26	2.53	2.35	1.70	1.95	2.93	3.22	2.60	2.40	....	....	1.85
27	2.55	2.35	1.55	2.00	3.05	3.00	2.65	2.30	....	....	1.8
28	2.60	2.38	1.40	2.25	2.98	2.98	2.50	2.30	....	1.65	1.95
29	2.75	....	1.35	2.45	3.00	3.00	2.58	2.20	....	1.85	2.0
30	2.80	....	1.40	2.37	3.00	2.93	2.45	2.10	....	1.6	1.75
31	2.74	....	1.40	....	3.12	....	2.45	2.05	....	1.65	....

NOTE.—Gage heights Jan. 1 to Feb. 28 distorted by ice.

Daily discharge, in second-feet, of Boulder Creek at Orodell, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	5	7	2	4	78	228	165	66	50	....	12
2	5	6	2	5.5	93	246	194	92	44	....	12
3	5	6	3	7	86	274	216	83	44	....	12
4	5	7	3	10	66	220	260	77	40	....	15
5	5	6	3.5	7	71	280	274	66	40	....	15
6	4	5	3.5	20	92	260	260	54	40	....	15
7	4	5	3.5	5.5	134	326	282	56	35	....	15
8	4	5	3.5	5.5	167	380	260	50	35	....	24
9	4	5	4	8.5	183	433	241	54	35	....	12
10	4	6	7	10	174	423	228	78	35	....	20
11	3	6	7	8.5	128	414	220	68	35	....	10
12	3	5	4	5.5	100	417	214	49	31	....	10
13	3	5	3.5	4	115	428	199	60	27	....	40
14	2.5	5	3.5	5.5	130	413	172	66	24	....	18
15	2.5	6	4	8	145	390	176	66	24	....	24
16	2.5	6	3.5	10	155	388	156	54	....	....	15
17	2.5	6	4	12	165	374	124	58	....	15	18
18	2.5	6	3.5	15	180	360	137	56	....	15	12
19	2.5	5	4	17	195	350	152	50	....	12	12
20	2.5	5	4	19	211	340	128	56	....	15	8
21	2.5	7	5.5	21	172	330	126	56	....	18	10
22	2.5	9	5.5	22	156	320	109	56	....	18	18
23	2.5	23	4	24	137	310	109	76	....	18	15
24	2.5	18	4	18	122	300	118	76	....	15	27
25	2.5	12	5.5	26	150	294	128	76	....	15	15
26	2.5	2	15	31	190	265	118	83	....	15	24
27	2.5	2	8.5	35	220	206	128	68	....	12	20
28	5	2	4	62	201	201	100	68	....	12	31
29	8	....	3.5	92	206	206	105	56	....	24	35
30	9	....	4	78	206	190	92	44	....	10	18
31	8	....	4	....	238	....	92	40	....	12	....

NOTE.—Daily discharge estimated, because of ice, Jan. 1 to Feb. 28. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Boulder Creek at Orodell, Colo., for 1911.

[Drainage area, 108 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	9	2.5	3.5	236
February	23	2	6.7	373
March	15	2	4.4	270
April	92	4	20	1,180
May	238	66	150	9,240
June	433	190	318	18,900
July	282	92	171	10,500
August	92	40	63	3,880
September 1-15	50	24	36	1,070
October 17-31	24	10	15	448
November	40	8	17	1,060
The period	....	....	....	47,200

SOUTH BOULDER CREEK NEAR ROLLINSVILLE, COLO.

Location.—At highway bridge in sec. 35, T. 1 S., R. 73 W., 1 mile west of Rollinsville, in the Pike National Forest. The nearest important tributary, Jennie Creek, enters 3 miles above.

Records available.—September 10, 1910, to December 31, 1911.

Drainage area.—39 square miles (measured from topographic sheets).

Gage.—Vertical staff.

Channel.—Fairly permanent.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no court decrees for diversions above the station, and therefore it is probable that the records represent the natural run-off.

Accuracy.—Conditions are favorable for fairly accurate results and the estimates of discharge should be reliable.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Discharge measurements of South Boulder Creek near Rollinsville, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 16[a]	R. H. Fletcher	1.10	8.1
Apr. 6	.....do	1.05	17.9
June 30	E. O. Christiansen	1.75	91.8
Sept. 17	H. B. Waha	1.10	17.4
Dec. 6[a]	.....do	.98	8.5

[a] Ice conditions.

Daily gage height, in feet, and discharge, in second-feet, of South Boulder Creek near Rollinsville, Colo., for 1910.

[F. D. Whitney, observer.]

Day.	September.		October.		Day.	September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
1			0.80	5	16		11		
2			.80	5	17		10		
3			.80	5	18	.90	9		
4			.85	7	19		9		
5			.90	9	20	.90	9		
6			.90	9	21	.95	12		
7					22	.90	9		
8					23	.90	9		
9					24		7		
10	0.90	9			25	.80	5		
11	.90	9			26		5		
12	.95	12			27		5		
13	.95	12			28		5		
14	.95	12			29		5		
15	.95	12			30		5		

Daily gage height, in feet, of South Boulder Creek near Rollinsville, Colo., for 1911.

[Ray R. Clarke, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			0.91		1.17			1.40				
2		0.89	.92	0.99					1.36	1.15		
3		.86	.90	1.00		2.20		1.35				
4		.87	.87		1.36	2.20	2.00	1.30		1.15		
5		.90		1.00	1.38	2.20			1.25			
6		.85	.85	1.05	1.55		2.30				1.30	0.98
7		.86	.90			2.20	2.10	1.45	1.22	1.20		
8		.89	.84	1.02	1.62		2.00	1.40	1.20		1.18	
9		.85			1.78					1.20		
10						2.25		1.35				
11		1.00		.98						1.50		1.20
12		.90			1.78	3.00	1.90	1.30				1.30
13		.96		1.04	1.70	2.20	1.80		1.15			
14		.94	.95		1.80	1.68	1.80					
15			.94	.81	1.90		1.75	1.30	1.18			
16		.90	.98	.90			1.75		1.35	1.50		1.40
17		.89	.93		2.00	2.15	1.75	1.30	1.15		1.20	
18			.98		2.00	2.15		1.30			1.10	
19		.95		1.08	2.20			1.30	1.15			
20		.92	.97			2.15	1.65	1.32		1.30	1.05	
21		.89	1.00				1.65		1.10			
22	0.82	.88	.90	1.10					1.10			
23	.78		.92		1.90	1.95			1.10		1.00	
24		.91	.92		1.80	1.90			1.10	1.30		
25	.92	.90	.96	1.10			1.60	1.45		1.20	1.02	
26	.94	.90		1.20		1.80		1.38				
27	.95	.93	.92	1.40	2.00	1.80	1.45			1.20		
28	.92	.91	.95	1.44							1.00	
29			.96		2.20	1.80	1.50	1.38	1.12			
30	.88		.92		2.00	1.75					1.00	
31	.88				2.10		1.45					

NOTE.—Ice caused backwater approximately Jan. 1 to Apr. 15 and Nov. 17 to Dec. 31.

Daily discharge, in second-feet, of South Boulder Creek near Rollinsville, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		24			46			
2						42	22	
3			168		40			
4		42	168	131	35		22	
5		44	168			30		
6		64		187				35
7			168	149	52	28	26	
8		74		131	46	26		25
9		97					26	
10			178		40			
11							58	
12		97	335	115	35			
13		85	168	100		22		
14		100	82	100				
15		115		92	35	25		
16	8			92		40	58	
17		131	158	92	35	22		
18		131	158		35			
19	18	168			35	22		
20			158	78	37		35	
21				78		19		
22	19					19		
23		115	123			19		
24		100	115			19	35	
25	19			58	52		26	
26	26		100		44			
27	46	131	100	52			26	
28	51							
29		168	100	58	44	20		
30		131	92					
31		149		52				

SOUTH BOULDER CREEK AT ELDORADO SPRINGS, COLO.[1]

Location.—At the mouth of the canyon at Eldorado Springs, in sec. 30, T. 1 S., R. 70 W., 3 miles southwest of Marshall. No important tributaries within several miles.

Records available.—May 15, 1895, to September 30, 1901; July 1, 1904, to December 31, 1911.

Drainage area.—125 square miles (measured from topographic sheets).

Gage.—Vertical staff; datum unchanged.

Channel.—Not known, as only the computed estimates are received.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months, and measurements are made to determine the flow.

Diversions.—There are court decrees for diversions of 137 second-feet above the station and 1,658 second-feet below. There are also a number of flood-water decrees.

Cooperation.—Since 1904 the station has been maintained by the State engineer by whom the records are furnished. The records for 1904 to 1908 were published only in the reports of the State engineer.

Discharge measurements of South Boulder Creek at Eldorado Springs, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 10	C. E. Turner	0.71	12.0	June 8	C. C. Hezmalhalch	2.25	230
Mar. 10	do	1.16	16.3	Aug. 2	do	1.30	34.0
10	do	1.16	17.3	23	do	1.80	80.0
Apr. 13	do	1.12	12.8	Sept. 15	do	1.15	17.2
May 19	do	2.20	207	Dec. 15	C. E. Turner	.92	7.3

Daily gage height, in feet, of South Boulder Creek at Eldorado Springs, Colo., for 1911.

[B. E. Cheseboro, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.9	1.1	0.9	1.20	1.6	2.3	1.8	1.45	1.25	1.2	1.2	1.1
2	.85	1.0	.95	1.2	1.55	2.45	2.0	1.4	1.2	1.2	1.0	1.1
3	.9	1.0	1.0	1.2	1.6	2.45	2.2	1.4	1.3	1.1	1.15	1.1
4	.9	1.0	1.0	1.2	1.65	2.3	2.25	1.4	1.3	1.15	1.15	1.05
5	.9	1.05	1.0	1.25	1.65	2.4	2.2	1.35	1.3	1.1	1.1	1.05
6	.9	.95	1.0	1.2	1.75	2.35	2.25	1.35	1.25	1.25	1.1	1.0
7	.9	.95	1.05	1.2	1.9	2.3	2.2	1.3	1.2	1.25	1.0	1.0
8	.95	1.0	1.1	1.2	1.95	2.35	2.1	1.25	1.2	1.2	1.15	1.0
9	.9	1.0	1.1	1.3	1.95	2.5	2.0	1.25	1.15	1.2	1.1	.9
10	1.0	1.0	1.1	1.2	2.05	2.4	1.9	1.3	1.15	1.2	1.1	.95
11	1.0	1.0	1.2	1.25	1.9	2.3	1.9	1.65	1.15	1.2	1.1	.95
12	1.0	1.0	1.1	1.25	1.9	2.3	1.85	1.6	1.15	1.2	1.0	.9
13	1.05	1.0	1.1	1.2	1.95	2.35	1.85	1.5	1.15	1.2	1.0	.9
14	1.0	1.0	1.1	1.2	2.0	2.3	1.95	1.35	1.15	1.2	1.05	.9
15	1.0	1.0	1.1	1.2	2.0	2.35	1.9	1.35	1.2	1.2	1.15	.9
16	1.0	1.0	1.2	1.2	2.1	2.35	1.9	1.35	1.15	1.1	1.15	.95
17	1.0	1.0	1.15	1.25	2.1	2.35	1.8	1.3	1.1	1.2	1.05	.95
18	1.0	1.0	1.2	1.2	2.15	2.15	1.8	1.3	1.1	1.2	1.05	.95
19	1.0	1.0	1.2	1.25	2.25	2.15	1.8	1.3	1.1	1.1	1.1	.95
20	1.0	.9	1.15	1.3	2.1	2.15	1.7	1.3	1.1	1.1	1.1	.95
21	1.0	.9	1.2	1.35	2.0	2.3	1.7	1.4	1.15	1.2	1.05	.95
22	1.0	.9	1.2	1.4	1.95	2.35	1.7	1.55	1.1	1.15	1.05	.95
23	1.0	.9	1.2	1.45	1.9	2.35	1.7	1.7	1.1	1.1	1.0	.95
24	1.0	.95	1.2	1.4	1.9	2.1	1.65	1.6	1.1	1.1	1.1	.95
25	1.05	1.0	1.2	1.4	2.0	2.1	1.6	1.5	1.1	1.1	1.1	.95
26	1.05	1.0	1.2	1.45	2.05	2.0	1.6	1.4	1.05	1.15	1.05	.95
27	1.05	1.0	1.2	1.5	2.1	1.95	1.55	1.4	1.05	1.1	1.0	.95
28	1.0	.9	1.2	1.6	2.15	1.95	1.5	1.35	1.05	1.1	.9	.95
29	1.1		1.2	1.65	2.1	1.95	1.5	1.3	1.05	1.05	1.0	.95
30	1.1		1.2	1.55	2.2	1.9	1.5	1.25	1.1	1.0	1.1	.95
31	1.1		1.2		2.3		1.5	1.2		1.05		

NOTE.—Ice present Jan. 1 to Mar. 2.

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[1] Called South Boulder Creek near Marshall in 1910 report.

Daily discharge, in second-feet, of South Boulder Creek at Eldorado Springs. Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4	2	6	20	58	246	104	48	21	20	20	14
2	4	2	8	20	52	316	153	43	18	20	9	14
3	4	2	9	20	58	316	212	44	25	14	17	14
4	4	2	9	20	66	246	231	44	25	17	17	12
5	4	2	9	24	66	292	212	38	25	14	14	12
6	4	2	9	20	84	269	231	38	21	24	14	9
7	4	2	12	20	117	246	212	33	18	24	9	9
8	4	2	14	20	130	269	181	29	19	20	17	9
9	4	1	14	27	130	340	153	28	15	20	14	6
10	4	1	14	20	159	293	127	32	16	20	14	8
11	4	1	20	24	117	250	127	75	17	20	14	8
12	4	1	14	24	117	250	116	66	17	20	9	6
13	4	1	14	20	130	272	116	50	17	20	9	6
14	4	1	14	20	144	250	140	33	17	20	12	6
15	4	1	14	20	144	272	127	83	20	20	17	6
16	3	2	20	20	174	272	127	32	17	14	17	8
17	3	2	17	24	174	231	104	27	14	20	12	8
18	3	2	20	20	191	196	104	27	14	20	12	8
19	3	2	20	24	227	196	104	25	14	14	14	8
20	3	4	17	27	174	196	85	24	14	14	14	8
21	3	4	20	31	144	250	85	31	17	20	12	8
22	3	4	20	35	130	272	85	45	14	17	12	8
23	3	4	20	40	117	231	85	68	14	14	9	8
24	3	7	20	35	117	181	76	50	14	14	14	8
25	3	9	20	35	144	181	68	39	14	14	14	8
26	2	9	20	40	159	153	68	30	12	17	12	8
27	2	9	20	45	174	140	61	30	12	14	9	8
28	2	6	20	58	191	140	54	27	12	14	6	8
29	2	....	20	66	174	140	54	23	12	12	9	8
30	2	....	20	52	208	127	54	20	14	9	14	8
31	2	....	20	....	246	....	54	17	....	12	....	8

NOTE.—Discharge estimated Jan. 1 to Mar. 2.

Monthly discharge of South Boulder Creek at Eldorado Springs, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	4	2	3.3	202
February	9	1	3.1	173
March	20	6	16	980
April	66	20	29	1,730
May	246	52	139	8,560
June	340	127	234	14,000
July	231	54	120	7,360
August	75	17	37	2,280
September	25	12	17	990
October	24	9	17	1,020
November	20	6	13	766
December	14	6	8.6	530
The year	340	1	53.2	38,600

BIG THOMPSON CREEK NEAR ARKINS, COLO.

Location.—At private bridge at the mouth of the canyon, in sec. 10, T. 5 N., R. 70 W., 2 miles southwest of Arkins; nearest perennial tributary, Buckhorn Creek, enters several miles below.

Records available.—April 1, 1888, to October 31, 1890; May 9, 1895, to September 2, 1903; July 16, 1904, to August 31, 1911. The records from 1904 to 1908 were published only in the reports of the State engineer.

Drainage area.—305 square miles.

Gage.—Vertical staff gage which remained unchanged from April 1, 1899, to July 16, 1904, when it was washed out. A second gage was installed at that time, which was referred to a different datum. In the spring of 1909 a third gage was installed, which was referred to a third datum.

Channel.—Practically permanent except during extreme flood stages.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during a portion of the winter months, and measurements are made to determine the discharge.

Diversions.—There is a court decree for a diversion of 198 second-feet from Big Thompson Creek above the station. Below, there are decrees for diversions of 2,624 second-feet from Big Thompson Creek, and flood-water diversions of 24,800 acre-feet.

Cooperation.—From 1888 to 1890 and subsequent to 1903 this station has been maintained by the State engineer, by whom the records are furnished.

Discharge measurements of Big Thompson Creek near Arkins, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 8[a]	C. E. Turner	0.96	6.5	June 19	C. E. Turner	2.68	519
Mar. 8	.....do	1.12	29.6	July 30	C. C. Hezmalhalch	1.80	157
Apr. 12	.....do	1.13	35.5	Aug. 20	.....do	1.55	103
27	.....do	1.30	65.3	Oct. 15	C. E. Turner	1.23	59.6
May 17	.....do	2.19	319	Dec. 14[a]	.....do	1.05	16.2

[a] Ice condition.

Daily gage height, in feet, and discharge, in second-feet, of Big Thompson Creek near Arkins, Colo., for 1911.

[J. F. Wagener, observer.]

Day.	May.		June.		July.		August.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			2.65	500	2.3	362	1.7	134
2			2.8	560	2.55	460	1.65	124
3			2.65	500	2.75	540	1.6	114
4			2.75	540	2.75	540	1.6	114
5			2.75	520	2.75	540	1.6	114
6			2.7	520	2.6	477	1.55	105
7			2.8	560	2.55	455	1.6	114
8			2.85	581	2.5	435	1.55	105
9			3.0	644	2.55	453	1.5	96
10			2.8	560	2.3	355	1.55	105
11	2.0	255	2.75	540	2.2	315	1.7	134
12	1.9	222	2.8	560	2.1	280	1.65	124
13	2.0	255	2.95	623	2.1	280	1.5	96
14	2.05	272	2.85	581	2.2	313	1.5	96
15	2.2	325	2.95	623	2.15	293	1.5	96
16	2.35	381	2.95	623	2.2	310	1.55	105
17	2.3	362	3.05	665	2.15	290	1.6	114
18	2.3	362	2.75	540	2.10	270	1.55	105
19	2.35	381	2.8	560	2.3	340	1.45	88
20	2.1	290	2.85	581	2.2	305	1.5	96
21	1.95	238	2.95	623	2.1	267	1.6	114
22	1.85	207	3.0	644	2.2	300	1.65	124
23	1.9	222	2.8	560	2.3	338	1.95	196
24	2.0	255	2.75	540	2.15	280	1.85	170
25	2.1	290	2.65	500	2.05	245	1.7	134
26	2.3	362	2.45	420	1.95	210	1.6	114
27	2.25	344	2.4	400	1.95	210	1.5	96
28	2.2	325	2.45	420	1.9	193	1.45	88
29	2.2	325	2.5	440	1.8	160	1.4	80
30	2.35	381	2.35	381	1.75	145	1.4	80
31	2.55	460			1.75	145	1.35	74

Monthly discharge of Big Thompson Creek near Arkins, Colo., for 1911.

[Drainage area, 305 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May 11-31	460	207	310	12,900
June	644	381	544	32,400
July	540	145	326	20,000
August	196	74	111	6,840

CACHE LA POUDRE RIVER NEAR ELKHORN, COLO.

Location.—At the lower bridge at Fry's ranch in the southern part of T. 9 N., R. 73 W., 7 miles southwest of Elkhorn post office.

Records available.—January 6, 1909, to December 31, 1911.

Drainage area.—250 square miles (measured from King's Atlas).

Gage.—Chain gage; datum unchanged.

Channel.—Fairly permanent.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months and frequent measurements are made to determine the discharge.

Diversions.—There are no diversions from the Cache la Poudre above the station, but the flow is increased by a diversion from Laramie River by the Skyline ditch which has a court decree for 400 second-feet.

Artificial control.—The flow is controlled to a certain extent by the reservoir at Chambers Lake, which is operated in the interest of irrigation diversions below.

Accuracy.—As the estimates of discharge are based on very frequent discharge measurements they should be excellent.

Cooperation.—Station maintained in cooperation with private persons through Mr. George B. McFadden, of Denver.

Discharge measurements of Cache la Poudre River near Elkhorn, Colo., in 1911.

[N. W. Fry and H. Mertens, hydrographers.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 5	3.48	26	Feb. 1	2.44	30	Mar. 6	2.38	29
7	3.34	28	2	2.07	10	7	2.28	20
8	3.17	25	3	2.03	10	7	2.54	34
9	2.78	17	4	2.02	18	8	2.29	25
10	2.64	21	6	2.25	18	9	2.30	24
11	2.62	18	7	2.11	11	10	2.38	32
12	2.56	24	8	2.13	13	11	2.26	28
13	2.56	26	9	2.14	14	12	2.39	31
14	2.59	30	10	2.24	17	13	2.73	60
15	2.60	32	11	2.28	19	14	2.60	41
16	2.70	34	12	2.32	23	15	2.50	39
17	2.59	35	13	2.38	25	16	2.41	33
18	2.57	33	14	2.24	21	18	2.36	31
19	2.45	31	15	2.16	15	19	2.38	33
20	2.40	24	16	2.33	24	20	2.36	35
24	2.49	30	17	2.23	23	21	2.31	29
25	2.53	37	24	3.12	39	22	2.34	29
26	2.53	40	25	2.33	24	24	2.31	29
27	2.49	33	Mar. 1	2.51	25	26	3.30	34
28	2.57	43	2	2.24	22	27	2.67	56
29	2.53	40	3	2.52	24	28	2.23	28
30	2.70	43	4	2.28	20	29	2.56	45
31	2.69	43	5	2.31	25	30	2.09	15

Discharge measurements of Cache la Poudre River near Elkhorn, Colo., in 1911—Contd.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 31	2.20	21	June 22	6.14	1,560	Sept. 10	2.86	[illegible]
Apr. 1	2.29	27	23	5.92	1,170	11	2.83	[illegible]
2	2.37	33	24	5.82	1,110	12	2.86	[illegible]
3	2.46	39	25	5.50	996	13	2.86	[illegible]
4	2.49	39	27	5.34	849	14	2.90	[illegible]
5	2.40	35	28	5.30	801	15	2.90	[illegible]
6	2.37	33	29	5.28	802	15	2.90	[illegible]
7	2.29	24	30	5.00	633	16	2.87	[illegible]
8	2.19	19	July 1	4.91	567	17	2.80	[illegible]
9	2.50	39	2	5.72	1,040	18	2.73	[illegible]
10	2.48	41	3	5.78	1,030	19	2.68	[illegible]
11	2.36	30	4	5.27	800	20	2.68	[illegible]
12	2.41	35	5	5.22	797	21	2.66	62
15	2.44	32	6	5.22	802	22	2.63	54
16	2.12	16	7	5.06	679	23	2.70	62
17	2.39	32	8	4.98	623	24	2.90	84
18	2.39	33	9	4.28	588	25	2.92	85
19	2.38	33	10	4.78	477	26	2.76	67
20	2.49	41	11	4.50	444	27	2.60	43
21	2.50	43	12	4.38	424	28	2.92	86
22	2.59	49	13	4.40	385	29	3.23	137
23	2.71	63	14	4.70	480	30	3.27	87
24	2.74	67	15	4.78	495	Oct. 1	3.27	156
25	2.71	65	16	4.96	578	2	3.20	125
26	2.68	63	17	4.62	416	3	3.10	121
27	2.92	91	18	4.40	378	4	3.08	108
28	3.04	103	19	4.54	400	5	3.14	122
30	3.01	106	20	4.42	384	6	3.53	192
May 1	2.92	91	21	4.37	362	7	3.36	169
2	2.87	89	22	4.36	389	8	3.28	151
3	2.86	83	23	4.38	350	9	3.12	114
4	2.92	99	24	4.20	268	10	2.76	70
5	3.17	134	25	4.12	253	11	3.08	111
6	3.56	197	26	4.02	232	12	3.00	99
7	3.70	307	27	4.00	239	13	2.92	89
8	4.26	386	28	3.94	221	14	2.98	96
9	4.41	469	30	3.78	176	16	2.76	69
10	4.84	582	31	3.68	164	17	2.96	91
11	4.33	423	Aug. 1	3.66	154	19	3.00	98
12	4.30	421	2	3.60	162	21	2.38	40
13	4.44	532	3	3.56	160	22	2.68	65
14	4.90	628	4	3.50	135	23	3.02	97
15	5.13	728	5	3.48	135	24	2.96	89
16	5.33	844	6	3.60	170	25	2.96	87
17	5.43	858	7	3.60	166	28	2.32	39
18	5.61	1,040	8	3.36	134	29	2.60	45
19	5.48	1,130	9	3.30	118	30	2.82	72
20	5.00	689	10	3.32	127	31	2.76	71
21	4.57	514	11	3.62	168	Nov. 2	2.56	48
22	4.52	468	12	3.60	165	3	2.72	63
23	4.54	488	13	3.36	123	4	2.90	75
24	4.98	500	14	3.23	112	5	2.67	60
25	5.23	811	15	3.21	104	7	2.57	46
26	5.52	961	16	3.19	96	8	2.76	70
27	5.20	756	17	3.20	100	10	2.78	69
28	5.28	787	18	3.19	106	15	3.07	55
29	5.50	958	19	3.18	102	16	2.98	52
30	5.62	1,030	20	3.16	98	18	2.84	72
31	5.90	1,230	21	3.40	128	19	2.70	41
June 1	6.10	1,380	22	3.40	129	20	2.54	36
2	6.20	1,660	23	4.00	251	21	2.50	35
3	6.16	1,540	24	3.56	163	22	2.51	36
4	5.98	1,380	25	3.36	123	24	2.87	36
5	6.10	1,420	26	3.26	108	25	2.84	31
6	6.14	1,490	27	3.12	99	Dec. 1	2.97	37
7	6.16	1,480	28	3.07	97	2	2.59	27
8	6.26	1,930	29	3.10	102	3	2.49	26
9	6.46	2,090	30	3.00	87	4	2.43	21
10	6.20	1,740	31	2.94	73	5	2.47	23
11	6.14	1,660	Sept. 1	2.94	70	6	2.37	19
12	6.20	1,820	2	3.02	82	7	2.43	22
13	6.24	1,770	3	3.00	75	8	2.38	21
14	6.20	1,670	4	3.10	94	9	2.38	21
15	6.10	1,590	5	3.08	88	12	2.53	26
17	6.30	1,970	6	3.00	104	15	2.73	24
18	6.15	1,540	7	3.04	106	17	2.78	28
19	6.08	1,380	8	2.98	92	22	2.86	25
20	6.10	1,440	9	2.90	87	23	2.89	26
21	6.08	1,510						

Daily gage height, in feet, of Cache la Poudre River near Elkhorn, Colo., for 1911.

[N. W. Fry, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.22	2.44	2.51	2.29	2.92	6.10	4.91	3.66	2.94	3.27	2.80	2.97
2	2.41	2.07	2.44	2.37	2.87	6.20	5.72	3.60	3.02	3.20	2.56	2.59
3	2.48	2.03	2.52	2.46	2.86	6.16	5.78	3.56	3.00	3.10	2.72	2.49
4	2.70	2.48	2.28	2.49	2.92	5.98	5.27	3.50	3.10	3.08	2.90	2.43
5	3.48	2.34	2.31	2.40	3.17	6.10	5.22	3.48	3.08	3.14	2.67	2.47
6	3.60	2.44	2.38	2.37	3.56	6.14	5.22	3.60	3.00	3.53	2.80	2.37
7	3.34	2.11	2.54	2.29	3.70	6.16	5.06	3.60	3.04	3.36	2.57	2.43
8	3.17	2.13	2.29	2.19	4.26	6.26	4.98	3.36	2.98	3.28	2.76	2.38
9	2.78	2.14	2.30	2.50	4.41	6.46	4.98	3.30	2.90	3.12	2.60	2.38
10	2.64	2.24	2.38	2.48	4.84	6.20	4.78	3.32	2.86	2.76	2.78	2.60
11	2.62	2.28	2.26	2.36	4.33	6.14	4.50	3.62	2.83	3.08	2.50	2.53
12	2.56	2.32	2.39	2.41	4.30	6.20	4.38	3.60	2.86	3.00	1.98	2.58
13	2.56	2.38	2.73	2.18	4.44	6.24	4.40	3.36	2.88	2.92	3.00	2.87
14	2.59	2.24	2.60	2.34	4.90	6.20	4.70	3.23	2.90	2.98	3.13	2.83
15	2.60	2.16	2.50	2.44	5.13	6.10	4.78	3.21	2.90	3.03	3.07	2.73
16	2.70	2.33	2.41	2.12	5.33	6.30	4.96	3.19	2.87	2.76	2.98	2.78
17	2.59	2.23	2.35	2.39	5.43	6.35	4.62	3.20	2.80	2.96	3.23	2.78
18	2.57	2.45	2.36	2.39	5.61	6.15	4.40	3.19	2.73	3.00	2.84	2.87
19	2.45	2.54	2.38	2.38	5.48	6.08	4.54	3.18	2.68	3.00	2.70	2.92
20	2.40	2.52	2.36	2.49	5.00	6.10	4.42	3.16	2.68	2.98	2.54	2.90
21	2.47	2.34	2.31	2.50	4.57	6.08	4.37	3.40	2.66	2.38	2.50	2.87
22	2.36	2.36	2.34	2.59	4.52	6.14	4.36	3.40	2.63	2.68	2.54	2.86
23	2.57	2.64	2.24	2.71	4.54	5.92	4.38	4.00	2.70	3.02	2.38	2.89
24	2.49	3.12	2.81	2.74	4.98	5.82	4.20	3.56	2.90	2.96	2.87	2.90
25	2.53	2.33	2.13	2.71	5.23	5.50	4.12	3.36	2.92	2.96	2.84	2.94
26	2.53	2.42	3.30	2.68	5.52	5.40	4.02	3.26	2.76	2.90	2.64	3.00
27	2.49	2.36	2.67	2.92	5.20	5.34	4.00	3.12	2.50	2.84	3.02	3.14
28	2.57	2.35	2.23	3.04	5.28	5.30	3.94	3.07	2.92	2.32	2.70	3.26
29	2.53	....	2.56	3.20	5.50	5.28	3.80	3.10	3.23	2.60	2.85	3.36
30	2.70	....	2.09	3.01	5.62	5.00	3.78	3.00	2.92	2.82	2.92	3.80
31	2.69	....	2.20	....	5.90	....	3.68	2.94	....	2.76	....	3.72

NOTE.—Ice caused backwater Jan. 1 to Apr. 1 and Nov. 24 to Dec. 31.

Daily discharge, in second-feet, of Cache la Poudre River near Elkhorn, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	26	30	25	27	77	1,490	565	176	79	119	65	37
2	26	10	22	31	72	1,590	1,140	166	87	110	45	27
3	26	10	24	37	71	1,550	1,190	160	85	97	58	26
4	26	18	20	39	77	1,370	779	151	97	95	75	21
5	26	18	25	33	106	1,490	744	148	95	102	54	23
6	27	18	29	31	160	1,530	744	166	85	156	65	19
7	28	11	27	26	182	1,550	646	166	90	131	46	22
8	25	13	25	20	308	1,660	600	131	83	120	61	21
9	17	14	24	40	353	1,880	600	123	75	100	48	21
10	21	17	32	39	530	1,590	500	126	71	61	63	23
11	18	19	28	31	329	1,530	380	169	68	95	40	25
12	24	23	31	34	320	1,590	344	166	71	85	11	28
13	26	25	60	20	362	1,630	350	131	73	77	85	27
14	30	21	41	29	560	1,590	460	114	75	83	101	25
15	32	15	39	36	688	1,490	500	111	75	89	93	24
16	34	24	33	17	821	1,700	590	109	72	61	83	26
17	35	23	32	32	894	1,760	428	110	65	81	114	28
18	33	26	31	32	1,040	1,540	350	109	59	85	69	27
19	31	27	33	32	934	1,470	396	107	54	85	56	27
20	24	29	35	30	610	1,490	356	105	54	83	43	26
21	26	31	29	40	408	1,470	341	137	53	32	40	26
22	27	33	29	47	388	1,530	338	137	50	54	43	25
23	28	36	29	57	396	1,320	344	240	56	87	32	28
24	30	39	29	60	600	1,230	290	160	75	81	32	27
25	37	24	32	57	751	950	270	131	77	81	33	26
26	40	24	34	54	966	870	245	118	61	75	33	25
27	33	24	56	77	730	828	240	100	40	69	34	25
28	43	25	28	90	786	800	228	93	77	28	35	25
29	40	....	45	110	960	786	200	97	114	48	36	25
30	43	....	15	86	1,050	610	196	85	77	67	37	25
31	43	....	21	....	1,300	....	179	79	....	61	....	25

NOTE.—Daily discharge determined from a rating curve that is very well defined. Discharge estimated or interpolated Jan. 1 to 4, 6, 21, 23, Feb. 5, 18 to 23, 26 to 28, Mar. 17, 23, 25, and Nov. 24 to 30, Dec. 10, 11, 13, 14, 16, 18 to 21 and 24 to 31. Discharge obtained from discharge measurements for other days between Jan. 1 and Apr. 1 and Nov. 24 and Dec. 31.

Monthly discharge of Cache la Poudre River near Elkhorn, Colo., for 1911.

[Drainage area, 250 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	43	17	29.8	0.119	0.14	1,830	B.
February	39	10	22.3	.089	.09	1,240	B.
March	60	15	31.1	.124	.14	1,910	B.
April	110	17	43.4	.174	.19	2,580	A.
May	1,300	71	543	2.17	2.50	33,400	A.
June	1,880	610	1,400	5.60	6.25	83,300	A.
July	1,190	179	469	1.88	2.17	28,800	A.
August	240	79	133	.532	.61	8,180	A.
September	114	40	73.1	.292	.33	4,350	A.
October	156	28	83.8	.335	.39	5,150	A.
November	114	11	54.3	.217	.24	3,230	A.
December	37	19	25.3	.101	.12	1,560	B.
The year	1,880	10	242	.969	13.17	176,000	

CACHE LA POUDRE RIVER NEAR FORT COLLINS, COLO.

Location.—In sec. 33, T. 9 N., R. 70 W., 1,000 feet below the intake for the Fort Collins waterworks, 15 miles above Fort Collins, 500 yards above junction with North Fork.

Records available.—January 8, 1909, to December 31, 1911.

Drainage area.—495 square miles (measured from King's Atlas).

Gage.—Vertical staff; datum unchanged.

Channel.—Fairly permanent.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during the winter months, and frequent measurements are made to determine the discharge.

Diversions.—There are no diversions between this station and the one above, near Elkhorn, except the intake for the Fort Collins waterworks.

Accuracy.—As the estimates of discharge are based on very frequent discharge measurements they should be excellent.

Cooperation.—Station maintained in cooperation with private persons through Mr. George B. McFadden, of Denver.

Discharge measurements of Cache la Poudre River near Fort Collins, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 1	F. H. Stearley	2.35	48	Mar. 5	Fletcher and Stearley	2.00	45
5	do	2.5	60	5	do	2.00	43
10	do	2.5	61	8	F. H. Stearley	2.00	53
15	do	2.5	63	11	do	2.00	53
17	do	2.35	48	14	do	1.90	62
20	do	2.3	54	16	do	2.00	63
23	do	2.15	25	20	do	2.00	62
26	do	2.3	53	24	do	2.00	62
Feb. 1	do	2.2	50	27	do	1.75	28
4	do	1.75	29	30	do	1.75	29
7	do	1.85	40	Apr. 2	do	1.90	51
10	do	2.00	57	9	do	1.90	48
17	do	1.90	46	11	Miles and Turner	2.00	51
21	do	2.00	42	12	F. H. Stearley	2.00	62
24	do	2.00	42	15	do	2.00	58
28	do	2.15	45	18	do	1.95	58
Mar. 2	do	2.20	47	20	do	1.95	55
4	do	2.25	48	24	do	2.2	104

Discharge measurements of Cache la Poudre River near Fort Collins, Colo., in 1911—Continued.

Date.		Hydrographer.	Gage. height.	Dis-charge.	Date.		Hydrographer.	Gage height.	Dis-charge.
			Feet.	*Sec.-ft.*				*Feet.*	*Sec.-ft.*
May	1	F. H. Stearley	2.60	170	Sept.	15	F. H. Stearley	2.30	103
	4	do	2.90	271		18	do	2.25	92.9
	6	do	3.10	317		21	do	2.20	86.4
	9	do	4.00	676		25	do	2.25	117
	14	do	4.30	869		29	do	2.30	101
	20	do	4.40	924	Oct.	1	do	2.50	169
	22	do	4.00	691		6	do	2.75	209
	24	do	4.30	868		9	do	2.50	163
June	2	do	5.90	2,110		13	do	2.60	179
	7	do	5.80	2,030		16	do	2.40	146
	15	do	5.80	2,070		19	do	2.35	93.3
	21	do	5.80	2,030		23	do	2.70	193
	27	do	4.90	1,240		28	do	2.20	83.7
	29	do	4.70	1,140	Nov.	1	do	2.20	98.9
July	5	do	4.70	1,140		4	do	2.10	86.2
	11	do	4.00	706		8	do	2.15	80.2
	15	do	4.00	709		10	do	2.25	98.5
	19	do	3.80	656		12	do	1.80	37.3
	23	do	3.90	674		16	do	2.15	82.4
Aug.	1	do	3.10	324		18	do	2.20	96.4
	4	do	2.95	243		22	do	1.75	31.7
	8	do	2.92	285		28	do	1.80	32.2
	12	do	3.05	292	Dec.	2	do	2.30	53.3
	16	do	2.75	215		6	do	2.30	51.2
	22	do	3.00	247		10	do	2.30	47.3
	30	do	2.55	148		14	do	2.10	44.1
Sept.	4	do	2.50	141		19	do	2.15	47.3
	8	do	2.50	146		23	do	2.20	49.6
	12	do	2.30	103		29	do	2.20	49.1

NOTE.—Ice present Jan. 1 to Mar. 4 and Dec. 2 to 29.

Daily gage height, in feet, of Cache la Poudre River near Fort Collins, Colo., for 1911.

[F. H. Stearley, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.35	2.10	2.20	1.90	2.65	5.50	4.35	3.05	2.42	2.60	2.18	2.30
2	2.40	1.98	2.25	1.90	2.75	5.80	4.90	3.05	2.45	2.65	2.18	2.35
3	2.50	1.85	2.28	1.92	2.85	5.55	5.05	2.95	2.45	2.70	2.08	2.32
4	2.50	1.78	2.28	2.00	2.95	5.55	4.75	2.93	2.42	2.72	2.08	2.40
5	2.50	1.82	2.00	2.00	3.05	5.85	4.65	3.05	2.45	2.78	2.08	2.35
6	2.50	1.85	2.00	2.00	3.20	5.87	4.55	2.95	2.45	2.72	2.05	2.30
7	2.55	1.88	2.00	1.95	3.60	5.87	4.55	2.92	2.45	2.62	2.08	2.30
8	2.50	1.95	2.00	1.90	3.85	5.75	4.45	2.85	2.45	2.60	2.12	2.28
9	2.50	2.05	2.00	1.90	4.20	5.90	4.35	2.80	2.35	2.45	2.12	2.22
10	2.50	2.05	2.00	2.00	4.35	5.75	4.25	3.10	2.35	2.45	2.23	2.30
11	2.50	2.05	2.00	2.00	3.75	5.55	4.02	3.05	2.25	2.72	1.95	2.25
12	2.50	1.92	1.95	2.00	4.05	5.45	4.05	2.98	2.25	2.65	1.72	2.20
13	2.50	1.90	1.88	2.00	4.20	5.40	3.95	2.90	2.25	2.55	1.85	2.15
14	2.50	1.92	1.95	2.05	4.45	5.50	3.92	2.78	2.25	2.45	2.00	2.15
15	2.48	1.90	2.00	2.00	4.80	5.70	4.10	2.75	2.25	2.45	2.10	2.15
16	2.40	1.90	2.00	2.00	5.10	5.70	4.20	2.72	2.25	2.35	2.15	2.10
17	2.35	1.90	2.00	1.95	5.15	5.35	3.90	2.75	2.22	2.35	2.18	2.12
18	2.35	1.90	2.00	1.92	5.00	5.45	3.85	2.72	2.20	2.32	2.15	2.15
19	2.30	1.95	2.00	1.92	4.85	5.35	3.75	2.75	2.18	2.32	2.05	2.15
20	2.30	1.98	2.00	1.98	4.35	5.35	3.72	2.78	2.15	2.38	1.95	2.18
21	2.28	2.00	2.02	2.05	4.25	5.65	3.75	2.92	2.18	2.25	1.95	2.12
22	2.22	2.00	2.05	2.12	4.00	5.40	3.75	2.92	2.28	2.15	1.85	2.2
23	2.18	2.00	2.00	2.18	4.15	5.20	3.85	3.02	2.45	2.70	1.85	2.18
24	2.20	2.00	2.00	2.20	4.45	5.10	3.60	2.95	2.28	2.50	1.85	2.15
25	2.22	2.00	2.00	2.28	4.75	4.90	3.50	2.95	2.20	2.35	2.00	2.15
26	2.30	2.05	1.85	2.30	4.85	4.90	3.50	2.72	2.22	2.25	1.95	2.15
27	2.30	2.10	1.80	2.45	4.90	4.80	3.42	2.65	2.18	2.18	2.00	2.12
28	2.22	2.12	1.82	2.58	5.00	4.70	3.40	2.55	2.25	2.15	1.88	2.15
29	2.20	......	1.82	2.75	5.10	4.68	3.35	2.55	2.25	2.18	1.80	2.18
30	2.12	......	1.78	2.75	5.10	4.5	3.25	2.48	2.25	2.18	1.90	2.20
31	2.15	......	1.90	......	5.35	......	3.25	2.45	......	2.15	......	2.20

Daily discharge, in second-feet, of Cache la Poudre River near Fort Collins, Colo., fo 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	48	50	47	49	178	1,760	900	292	129	165	88	51
2	51	43	47	49	202	2,030	1,270	292	135	178	88	53
3	54	36	48	52	230	1,800	1,390	260	135	190	73	53
4	57	29	48	62	260	1,800	1,160	254	129	195	73	52
5	60	32	62	62	292	2,080	1,080	292	135	210	73	51
6	60	36	62	62	345	2,090	1,020	260	135	195	69	51
7	60	40	62	56	500	2,090	1,020	251	135	170	73	50
8	61	46	62	49	625	1,980	960	230	135	165	79	49
9	61	52	62	49	810	2,120	900	215	116	135	79	48
10	61	57	62	62	900	1,980	840	310	116	135	96	47
11	61	56	62	62	575	1,800	710	292	99	195	56	46
12	62	54	56	62	725	1,720	725	269	99	178	30	45
13	62	52	47	62	810	1,670	675	245	99	155	44	44
14	63	51	56	69	960	1,760	660	210	99	135	62	44
15	63	49	62	62	1,190	1,940	750	202	99	135	76	45
16	56	47	62	62	1,430	1,940	810	195	99	116	84	46
17	48	46	62	56	1,470	1,630	650	202	94	116	88	46
18	50	45	62	52	1,350	1,720	625	195	91	111	84	47
19	52	44	62	52	1,230	1,630	575	202	88	111	69	47
20	54	43	62	59	900	1,630	560	210	84	121	56	48
21	45	42	65	69	840	1,900	575	251	88	99	56	48
22	35	42	69	79	700	1,670	575	251	104	84	44	49
23	25	42	62	88	780	1,510	625	282	135	190	44	50
24	34	42	62	91	960	1,430	500	260	104	145	44	50
25	44	42	62	104	1,160	1,270	460	260	91	116	62	50
26	53	43	44	107	1,230	1,270	460	195	94	99	56	50
27	53	44	38	135	1,270	1,190	428	178	88	88	62	49
28	52	45	40	161	1,350	1,120	420	155	99	84	47	49
29	52	....	40	202	1,430	1,110	400	155	99	88	38	49
30	51	....	36	202	1,430	990	362	141	99	88	49	49
31	50	....	49	....	1,630	....	362	135	....	84	....	49

NOTE.—Daily discharge determined from a rating curve that is very well defined. Discharge estimated or interpolated Jan. 2 to 4, 6 to 9, 11 to 14, 16, 18, 19, 21, 22, 24, 25, 27 to 31; Feb. 2, 3, 5, 6, 8, 9, 11 to 16, 18 to 20, 22, 23, 25 to 27; Mar. 2, 3; Dec. 1, 3 to 5, 7 to 9, 11 to 13, 15 to 18, 20 to 22, 24 to 28, 30, 31. Discharges obtained from discharge measurements for other days between Jan. 1 and Mar. 4 and Dec. 1 and 31.

Monthly discharge of Cache la Poudre River near Fort Collins, Colo., for 1911.

[Drainage area, 495 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	63	25	52.8	0.107	0.12	3,250	C.
February	57	29	44.6	.090	.09	2,480	C.
March	69	36	55.5	.112	.13	3,410	A.
April	202	49	79.6	.161	.18	4,740	A.
May	1,630	178	896	1.81	2.09	55,100	B.
June	2,120	990	1,690	3.41	3.80	101,000	B.
July	1,390	362	724	1.46	1.68	44,500	B.
August	310	135	230	.465	.54	14,100	A.
September	135	84	108	.218	.24	6,430	A.
October	210	84	138	.279	.32	8,480	A.
November	96	30	64.7	.131	.15	3,850	A.
December	53	44	48.5	.098	.11	2,980	C.
The year	2,120	25	345	.695	9.45	250,000	

CACHE LA POUDRE RIVER AT MOUTH OF CANYON, NEAR FORT COLLINS, COLO.

Location.—In sec. 15, T. 8 N., R. 70 W., 3 miles below the intake of the Fort Collins waterworks, 12 miles above Fort Collins; half a mile above mouth of Lewstone Creek.

Records available.—March 15, 1884, to October 15, 1901; February 3, 1910, to December 31, 1911.

Drainage area.—1,060 square miles.

Gage.—An automatic recording gage installed November 30, 1909; datum unchanged. No information available concerning the gage used from 1884 to 1901.

Channel.—Practically permanent.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—There is a court decree for a diversion of 57 second-feet from Cache la Poudre River between this station and the one 3 miles above, and decrees for diversions of 119 second-feet from intervening tributaries. Below the station there are decrees for diversions of 3,105 second-feet from the river. In addition, there are numerous decrees for flood-water diversions.

Cooperation.—From 1884 to 1901 the records were maintained by Prof. L. G. Carpenter of the Colorado State Agricultural College. Since 1910 the records have been furnished by the State engineer, by whom the station is maintained.

Discharge measurements of Cache la Poudre River at mouth of canyon, near Fort Collins, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 7[a]	C. E. Turner	−0.20	44.2	July 28	C. C. Hezmalhalch	1.85	373
Mar. 7	do	0.88	54.5	Aug. 18	do	1.44	178
Apr. 11	do	1.12	104	Sept. 15	Grieve & Hezmalhalch	1.20	108
27	do	1.29	138	Oct. 14	C. E. Turner	1.18	103
May 17	do	3.02	1,326	Dec. 12[a]	do	1.08	39.6
27	Thos. Grieve	2.92	1,191				

[a] Ice conditions.

Daily gage height, in feet, of Cache la Poudre River at mouth of canyon, near Fort Collins, Colo., for 1911.

[T. R. McKnight, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.7	1.45	3.3	3.5	1.6	1.65	1.5	0.65	1.0
2		.7	1.45	3.4	3.5	1.7	1.9	1.5	.9	1.2
3		.85	1.45	3.45	3.25	1.45	1.9	1.35	.9	.95
4		1.0	1.55	3.4	3.4	1.45	1.85	1.3	.85	.7
5	0.7	.95	1.65	3.45	3.15	1.45	1.75	1.3	.9	.7
6	.7	.85	2.05	3.45	3.0	1.55	1.45	1.5	.9	.55
7	.75	.85	2.1	3.4	3.1	1.35	1.5	1.55	.8	.55
8	.95	.8	2.3	3.6	2.95	1.45	1.55	1.4	.9	.55
9	.7	.8	2.15	3.8	2.5	1.45	1.55	1.4	.95	.55
10	.7	.95	2.55	3.65	2.4	1.4	1.35	1.35	1.05	
11	.65	.95	2.35	3.4	2.35	1.4	1.25	1.25		
12	.7	.8	2.3	3.4	2.3	1.5	1.25	1.25		
13	.65	.75	2.4	3.4	2.25	1.55	1.30	1.2	.8	
14	.6	.8	2.6	3.3	2.35	1.45	1.2	1.2	1.05	
15	.6	.85	2.7	3.4	2.3	1.45	1.25	1.15	1.1	
16	.75	.85	2.85	3.6	2.3	1.4	1.25	1.15	1.1	
17	.8	.9	2.9	3.8	2.3	1.4	1.25	1.1	1.1	
18	.85	.85	2.9	3.4	2.15	1.45	1.15	1.15	1.2	
19	.7	.85	2.95	3.25	2.0	1.45	1.15	1.15	1.1	
20	.75	.85	2.65	3.25	2.15	1.4	1.15	1.15	.95	
21	.8	.9	2.55	3.25	2.1	1.4	1.15	1.15	.95	
22	.8	.95	2.5	3.2	2.3	1.5	1.15	1.0	.9	
23	.85	1.0	2.5	3.2	1.95	1.7	1.15	1.15	.9	
24	.8	1.2	2.6	3.15	1.35	1.7	1.25	1.15	.9	
25	.7	1.2	2.6	2.9	1.15	1.7	1.2	1.1	.95	
26	.7	1.2	3.0	2.8	1.53	1.6	1.2	1.05	.85	
27	.8	1.2	2.8	3.0	1.35	1.5	1.15	1.1	.7	
28	.8	1.2	2.75	3.3	1.6	1.5	1.15		.6	
29	.85	1.2	2.9	3.45	1.85	1.5	1.25	.7	.6	
30	.85	1.45	2.95	3.5	1.75	1.55	1.35	.7	.8	
31	.8		3.1		1.65	1.6		.75		

NOTE.—Ice present Jan. 1 to Mar. 4 and Dec. 10 to 31.

Daily discharge, in second-feet, of Cache la Poudre River at mouth of canyon, near Fort Collins, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	45	45	35	35	198	1,625	1,860	255	278	215	70	70
2	45	45	35	35	198	1,860	1,860	300	400	215	70	70
3	45	45	35	50	198	1,800	1,568	198	400	162	62	60
4	45	45	35	70	235	1,740	1,740	198	375	145	62	60
5	45	45	35	62	278	1,800	1,455	198	325	145	55	60
6	45	45	35	50	490	1,800	1,290	235	198	215	55	50
7	45	45	40	50	520	1,740	1,400	162	215	235	45	50
8	55	45	62	45	660	1,985	1,240	198	235	180	55	50
9	55	45	35	45	555	2,235	810	198	235	180	62	50
10	55	45	35	62	855	2,048	730	180	162	162	80	45
11	55	45	32	62	695	1,740	695	180	130	130	75	45
12	55	45	35	45	660	1,740	660	215	130	130	70	40
13	55	45	32	40	730	1,740	625	235	145	115	62	40
14	55	45	30	45	900	1,625	695	198	115	115	80	40
15	55	45	30	50	990	1,740	660	198	130	102	90	40
16	50	45	40	50	1,140	1,985	660	180	130	102	90	40
17	50	45	45	50	1,190	2,235	660	180	130	90	90	40
18	50	45	50	55	1,190	1,740	555	198	102	102	90	40
19	50	45	35	50	1,240	1,568	460	198	102	102	90	40
20	50	40	40	50	945	1,568	555	180	102	102	62	40
21	45	40	45	55	855	1,568	520	180	102	102	62	40
22	45	40	45	62	810	1,510	660	215	102	70	55	40
23	45	40	50	70	810	1,510	430	300	102	102	55	40
24	45	40	45	115	900	1,455	162	300	130	102	55	40
25	45	40	35	115	900	1,190	102	300	115	90	62	40
26	45	40	35	115	1,290	1,090	235	255	115	80	50	40
27	45	40	45	115	1,090	1,290	162	215	102	80	50	40
28	45	40	45	115	1,040	1,625	255	215	102	80	50	40
29	45	....	50	115	1,190	1,800	375	215	130	80	50	40
30	45	....	50	198	1,240	1,860	325	235	162	80	50	40
31	45	....	45	....	1,400	....	278	255	....	80	....	40

NOTE.—Daily discharge estimated because of ice Jan. 1 to Mar. 4 and Dec. 10 to 31. Discharge Nov. 11-12 interpolated because of missing gage heights.

Monthly discharge of Cache la Poudre River at mouth of canyon, near Fort Collins, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	55	45	48	2,960
February	45	40	43	2,410
March	62	30	40	2,460
April	198	35	69	4,120
May	1,400	198	819	50,400
June	2,240	1,090	1,710	102,000
July	1,860	102	764	47,000
August	300	162	218	13,400
September	400	102	173	10,300
October	235	70	126	7,720
November	90	45	65	3,880
December	70	40	46	2,800
The year	2,240	30	343	249,000

LOUP RIVER AT COLUMBUS, NEBR.

Location.—At highway bridge in sec. 25, T. 17 N., R. 1 W., at Columbus, Nebr. No tributaries between the station and the mouth of the river 3 miles below.

Records available.—October 13, 1894, to December 31, 1911.

Drainage area.—13,500 square miles.

Gage.—A chain gage installed at the highway bridge June 24, 1904, and set to read the same as the original vertical staff gage, which was located 1½ miles above the bridge and was used from October 13, 1894, to that date. Owing to the slope of the river, however, the datum of the chain gage is 8.56 feet lower than that of the upper gage.

Channel.—Extremely shifting.

Discharge measurements.—Made from highway bridge.

Winter flow.—Ice causes backwater during the winter months and observations are discontinued.

Diversions.—Prior to September 1, 1912, there were approved diversions of 1,764 second-feet for irrigation and 4,700 second-feet for power from Loup River above the station. There were also approved diversions of 2,046 second-feet for irrigation and 3,130 second-feet for power, from tributaries entering above.

Accuracy.—The extremely shifting channel makes it impossible to make estimates of daily discharge without almost weekly measurements, as the gage heights afford only an approximate indication of the flow.

Cooperation.—During 1911 the station was maintained in cooperation with the State engineer, by whom the field data were furnished.

Discharge measurements of Loup River at Columbus, Nebr., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 23	A. A. Dobson	4.22	2,980	July 31	A. B. Price	4.10	1,900
Apr. 25	A. B. Price	4.45	2,470	Aug. 10	.....do	4.40	2,580
May 18	.....do	3.90	2,730	25	.....do	4.30	2,270
26	.....do	4.50	2,610	Sept. 11	.....do	4.70	3,320
June 13	.....do	4.50	2,180	24	.....do	4.40	2,070
21	.....do	4.30	1,970	Oct. 4	.....do	4.40	2,450
July 8	.....do	4.35	1,460	Nov. 10	.....do	4.40	4,170

Daily gage height, in feet, of Loup River at Columbus, Nebr., for 1911.

[W. D. Benson, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	4.4	5.25	4.5	4.15	3.95	4.0	4.4	....	....
2	....	4.4	4.55	4.6	4.1	4.05	4.25	4.4	4.5	....
3	....	4.35	4.45	4.5	4.2	4.25	4.4	4.45	....	....
4	....	4.5	4.5	....	4.15	4.15	4.3	4.4	4.2	....
5	....	4.6	4.65	4.6	4.2	4.25	4.45	4.65	4.15	....
6	....	4.4	4.75	4.55	4.2	4.2	....	6.5	4.45	....
7	....	4.3	4.65	4.6	....	4.4	4.4	5.95	4.45	....
8	....	4.3	4.6	4.65	4.35	4.45	4.4	5.0	4.45	4.45
9	....	4.35	4.5	4.4	4.55	4.35	4.8	4.8	4.2	4.2
10	....	....	4.3	4.45	4.45	4.5	5.55	4.3	4.25	4.35
11	....	4.35	4.25	4.4	4.8	4.4	4.65	4.55	....	4.5
12	4.6	....	4.35	4.5	4.45	4.3	4.8	4.35	....	4.7
13	4.45	4.5	....	4.5	4.3	4.4	4.35	4.4	....	4.75
14	4.6	4.55	6.0	4.5	5.35	....	4.3	4.55	....	4.6
15	4.6	4.5	4.45	4.45	4.5	4.35	4.35	4.6	....	4.55
16	4.75	4.45	....	4.3	4.7	4.35	4.15	4.65	....	4.5
17	4.55	4.5	3.85	4.3	5.0	4.15	4.25	4.8	4.5	4.2
18	4.5	4.4	4.25	4.45	4.7	4.1	4.35	4.65	....	....
19	4.3	4.5	....	4.45	4.5	4.25	4.35	4.7	....	4.45
20	4.15	4.55	4.15	4.4	4.65	4.5	4.3	4.8	4.9	....
21	4.0	4.45	4.4	4.35	4.45	4.65	4.35	4.75	4.7	4.8
22	4.5	4.4	4.9	4.3	4.3	4.5	4.4	4.6	4.3	4.65
23	....	4.4	5.65	4.25	....	4.75	....	4.65	....	4.6
24	4.2	4.45	4.35	4.25	5.1	4.55	4.4	4.7	....	4.4
25	4.2	4.45	4.35	4.35	4.8	4.3	4.4	4.75	....	4.65
26	4.4	4.5	4.5	4.5	4.65	4.25	4.4	4.75	....	....
27	4.4	4.45	4.7	5.1	4.45	4.2	4.4	4.6	....	....
28	4.45	....	4.7	4.95	4.2	4.3	4.4	4.5	....	....
29	4.45	4.55	4.75	4.55	4.0	....	4.6	4.5	....	....
30	4.45	4.75	4.65	4.3	4.0	4.2	4.6	4.6	....	....
31	4.4	....	4.7	....	4.0	3.85	....	4.3	....	....

NOTE.—Ice caused backwater at gage Nov. 11 to Dec. 31.

ELKHORN RIVER AT WATERLOO, NEBR.

Location.—At the highway bridge half a mile north of Waterloo on the line between secs. 3 and 10, T. 15 N., R. 10 E. No tributary within several miles.

Records available.—May 19 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain gage; datum unchanged.

Channel.—Extremely shifting.

Discharge measurements.—Made from the highway bridge.

Winter flow.—Records not of sufficient length to determine effect of ice.

Diversions.—Prior to September 1, 1912, there were approved diversions of 147 second-feet for irrigation and 538 second-feet for power from Elkhorn River above the station. From the tributaries entering above there were approved diversions of 174 second-feet for power development.

Accuracy.—Daily discharge computed indirectly and can be considered only approximate.

Cooperation.—Station maintained by the State engineer, by whom the field data are furnished.

Discharge measurements of Elkhorn River at Waterloo, Nebr., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 19	A. B. Price	3.00	1,060	Aug. 9	A. B. Price	1.40	537
30	.....do	2.60	930	28	.....do	1.50	425
June 12	.....do	1.90	655	Sept. 12	.....do	1.30	303
23	.....do	2.10	844	Oct. 3	.....do	1.60	491
July 8	.....do	1.60	598	Nov. 9	.....do	2.10	920
31	.....do	1.40	434				

Daily gage height, in feet, of Elkhorn River at Waterloo, Nebr., for 1911.

[John Todd, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.50	4.00	1.30	1.51	1.60	2.13	2.90
2		2.45	3.75	1.28	1.50	1.65	2.13	2.70
3		2.40	3.55	1.37	1.45	1.65	2.15	2.60
4		2.35	2.90	1.48	1.40	1.68	2.12	2.90
5		2.37	2.34	1.40	1.30	1.70	2.10	2.90
6		2.33	2.05	1.50	1.28	1.90	2.15	2.86
7		2.35	1.90	1.60	1.35	2.05	2.14	2.98
8		2.15	1.70	1.64	1.32	2.10	2.20	2.65
9		2.10	1.50	1.69	1.38	2.20	2.30	2.68
10		2.05	1.75	1.60	1.40	2.55	2.27	2.98
11		2.00	1.67	1.54	1.40	2.55	2.20	3.05
12		1.90	1.70	1.50	1.41	2.60	1.50	2.81
13		1.90	1.77	1.50	1.54	2.40	2.24	2.96
14		1.90	1.75	1.47	1.46	2.28	2.40	2.77
15		1.85	1.70	1.44	1.38	2.10	2.45	2.61
16		1.76	1.75	1.44	1.34	2.05	2.45	2.61
17		2.35	1.73	1.46	1.36	2.00	2.35	2.67
18		2.50	1.65	1.54	1.32	2.00	2.45	2.52
19	3.00	3.40	1.64	1.64	1.30	2.00	2.45	2.35
20		2.75	1.60	2.02	1.30	2.01	2.36	2.40
21		2.35	1.55	1.58	1.35	2.10	2.30	2.30
22		2.30	1.50	1.47	1.28	2.00	2.40	2.38
23		2.10	1.50	1.40	1.32	2.20	2.40	2.24
24	3.35	1.90	1.58	1.40	1.40	2.18	1.73	2.20
25	3.30	1.90	1.55	1.46	1.40	2.18	2.10	2.26
26	3.20	1.84	1.56	1.45	1.42	2.15	2.45	2.15
27	3.10	1.70	1.54	1.40	1.41	2.16	2.33	2.80
28	3.00	2.50	1.46	1.56	1.38	2.15	2.40	3.15
29	2.70	3.75	1.40	1.50	1.40	2.10	2.60	3.06
30	2.60	4.25	1.40	1.50	1.47	2.18	2.90	3.28
31	2.57		1.31	1.50		2.10		3.30

NOTE.—Gage heights distorted by ice Nov. 12, 24, 25, 29, 30, and Dec. 1 to 31.

Daily discharge, in second-feet, of Elkhorn River at Waterloo, Nebr., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	840	3,420	380	417	480	963
2	....	800	3,080	400	410	520	963
3	....	860	2,810	460	380	520	965
4	....	820	1,920	540	350	544	952
5	....	830	1,300	510	300	560	930
6	....	900	980	590	292	730	985
7	....	920	830	660	325	880	974
8	....	740	650	720	310	930	1,040
9	....	780	500	770	340	1,040	1,040
10	....	740	700	690	350	1,490	1,120
11	....	700	630	640	350	1,490	1,040
12	....	660	650	610	356	1,560	1,060
13	....	660	710	560	438	1,290	1,090
14	....	660	700	545	386	1,140	1,290
15	....	620	650	520	340	930	1,360
16	....	545	700	520	320	880	1,360
17	....	1,100	680	490	330	830	1,220
18	....	1,280	610	560	310	830	1,360
19	1,060	2,420	610	630	300	830	1,360
20	1,170	1,580	580	960	300	840	1,240
21	1,280	1,100	540	580	325	930	1,160
22	1,390	1,050	500	500	292	830	1,290
23	1,500	840	500	450	310	1,040	1,290
24	1,600	660	570	450	350	1,020	1,310
25	1,540	660	540	386	350	1,020	1,340
26	1,400	630	550	380	362	985	1,360
27	1,400	560	530	350	356	996	1,200
28	1,280	1,340	460	452	340	985	1,290
29	960	2,980	435	410	350	930	1,200
30	860	3,670	435	410	392	1,020	1,200
31	900	....	380	410	....	930	....

NOTE.—Daily discharge determined from a series of parallel rating curves poorly defined; discharge interpolated May 20 to 23, Nov. 12, 24, 25, 29, and 30.

Monthly discharge of Elkhorn River at Waterloo, Nebr., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 19-31	1,600	860	1,260	32,500	D.
June	3,670	545	1,060	63,100	D.
July	3,420	380	908	55,800	D.
August	960	350	533	32,800	D.
September	438	292	344	20,500	D.
October	1,560	480	935	57,500	D.
November	1,360	930	1,170	69,600	D.
December	....	....	1,000	61,500	
The period	....	....	....	393,000	

KANSAS RIVER BASIN.

REPUBLICAN RIVER AT BOSTWICK, NEBR.

Location.—At highway bridge about 1 mile southwest of Bostwick, on the line between secs. 22 and 23 in T. 1 N., R. 8 W. Nearest tributary a small intermittent stream which enters a short distance below.

Records available.—June 6, 1904, to December 31, 1911. From June 20, 1896, to November 30, 1903, a station was maintained at Superior, 10 miles downstream. As there are no important tributaries nor diversions between, the records at the two points are very nearly comparable.

Drainage area.—23,300 square miles.

Gage.—Chain gage; datum unchanged.

Channel.—Shifting at intervals.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months and during that period the observations are discontinued.

Diversions.—Prior to September 1, 1912, there were approved diversions of 862 second-feet for irrigation and 150 second-feet for power from Republican River above the Bostwick station.

Accuracy.—During 1911 the channel did not shift to any great extent and the estimates of discharge should be reliable.

Cooperation.—During 1911 this station was maintained in cooperation with the State engineer, by whom the field data were furnished.

Discharge measurements of Republican River at Bostwick, Nebr., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 8	A. A. Dobson	0.91	384	Aug. 8	A. B. Price	9.28	15,500
May 14	A. B. Price	1.70	367	Sept. 17	.....do	3.00	1,700
June 7	.....do	1.30	129	Nov. 1	.....do	1.20	298
July 22	.....do	1.85	418				

Daily gage height, in feet, of Republican River at Bostwick, Nebr., for 1911.

[J. W. Keifer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.9	2.2	3.2	1.5	1.5	1.3	0.9	2.6	2.2	1.7	1.2	1.5
2	1.9	1.9	3.0	1.5	1.4	1.3	.9	2.0	2.0	1.3	1.2	1.5
3	1.9	1.9	2.0	1.5	1.5	1.4	.9	9.65	1.8	1.3	1.2	1.5
4	1.9	1.9	2.0	1.5	1.5	1.3	.8	9.3	1.7	1.2	1.2	1.2
5	1.9	1.9	1.9	1.5	1.6	1.3	.8	9.92	1.7	1.2	1.2	1.2
6	1.9	2.0	1.9	1.5	1.6	1.3	.8	[a]10.0	1.8	1.2	1.2	1.3
7	1.9	2.0	1.9	1.5	1.6	1.3	.8	9.15	1.6	1.2	1.2	1.3
8	1.9	1.9	2.0	1.6	1.6	1.3	.7	9.45	1.5	1.3	1.2	1.3
9	1.9	1.7	2.0	1.7	1.6	1.3	.9	9.52	1.7	3.4	1.1	1.4
10	1.9	1.7	1.9	1.7	1.6	1.2	.9	8.92	2.0	2.5	1.2	1.4
11	1.9	1.7	1.9	1.7	1.6	1.2	1.0	6.95	1.7	2.0	1.2	1.5
12	1.9	1.7	1.8	1.7	1.6	1.1	1.0	4.7	2.0	1.8	1.3	1.4
13	1.9	1.8	1.8	1.7	1.6	1.1	4.2	3.8	4.5	1.7	1.3	1.4
14	1.9	1.9	1.8	1.6	1.7	1.1	2.7	3.4	3.0	1.5	1.3	1.4
15	......	1.9	1.7	1.6	1.6	1.0	3.0	4.2	2.4	1.4	1.3	1.4
16	1.9	1.9	1.7	1.6	1.6	1.0	4.6	3.3	2.2	1.4	1.3	1.4
17	......	1.9	1.7	1.5	1.6	1.0	3.7	3.0	2.0	1.3	1.3	1.4
18	......	1.9	1.7	1.5	2.0	1.0	2.9	2.8	1.9	1.3	1.3	1.3
19	2.1	1.8	1.7	1.5	1.9	1.2	2.4	3.0	1.9	1.3	1.3	1.4
20	2.1	2.2	1.7	1.5	1.8	1.1	2.1	3.7	1.9	1.3	1.3	1.3
21	2.1	1.9	1.6	1.5	1.7	1.9	2.0	3.6	1.8	1.3	1.3	1.3
22	2.1	2.0	1.6	1.5	1.6	1.8	1.9	3.5	1.7	1.2	1.3	1.3
23	2.1	2.0	1.6	1.5	1.6	1.6	4.0	3.3	1.7	1.2	1.3	1.4
24	2.1	1.9	1.6	1.4	1.5	1.5	2.8	4.2	1.7	1.2	1.4	1.5
25	2.1	2.0	1.6	1.4	1.5	1.3	3.0	3.1	1.4	1.2	1.4	1.5
26	2.3	2.0	1.6	1.4	1.4	1.2	3.5	2.7	1.4	1.2	1.4	1.5
27	2.2	2.0	1.6	1.3	1.5	1.1	4.0	2.4	1.4	1.2	1.4	1.4
28	2.2	1.6	1.5	1.4	1.5	1.1	2.8	2.3	1.3	1.1	1.5	1.4
29	2.2	......	1.5	2.0	1.4	1.1	2.5	2.4	1.3	1.1	1.5	1.4
30	2.2	......	1.5	1.9	1.4	1.0	2.5	2.4	1.4	1.1	1.5	1.4
31	2.2	......	1.5	......	1.4	......	2.2	2.5	......	1.2	......	1.4

[a] Maximum reading 10.1.

NOTE.—Backwater from ice Jan. 1 to Feb. 1 and Nov. 24 to Dec. 31.

Daily discharge, in second-feet, of Republican River at Bostwick, Nebr., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct	Nov.
1		1,930	240	240	160	55	1,130	850	510	280
2		1,650	240	200	160	55	550	700	320	280
3		550	240	240	200	55	16,700	570	320	280
4		550	240	240	160	40	15,700	510	280	280
5	470	470	240	290	160	40	17,400	510	280	280
6	550	470	240	290	160	40	17,600	570	280	280
7	550	470	240	290	160	40	15.100	460	280	280
8	470	550	290	290	160	25	16,200	410	320	280
9	340	550	340	290	160	55	16,400	510	2,210	250
10	340	470	340	290	120	55	14,500	700	1,130	280
11	340	470	340	290	120	70	9,200	510	700	280
12	340	400	340	290	90	70	4,300	700	570	320
13	400	400	340	290	90	3,400	2,790	3,900	510	320
14	470	400	290	340	90	1,260	2,210	1,690	410	320
15	470	340	290	290	70	1,650	3,400	1,030	360	320
16	470	340	290	290	70	4,100	2,070	850	360	320
17	470	340	240	290	70	2,640	1,690	700	320	320
18	470	340	240	550	70	1,520	1.450	630	320	320
19	400	340	240	470	120	910	1,690	630	320	320
20	720	340	240	400	90	630	2.640	630	320	320
21	470	290	240	340	470	550	2,490	570	320	320
22	550	290	240	290	400	470	2,350	510	280	320
23	550	290	240	290	290	3,100	2,070	510	280	320
24	470	290	200	240	240	1,390	3,400	510	280	
25	550	290	200	240	160	1,650	1,810	360	280	
26	550	290	200	200	120	2,350	1,340	360	280	
27	550	290	160	240	90	3,100	1,030	360	280	
28	290	240	200	240	90	1.390	940	320	250	
29		240	550	200	90	1,010	1,030	320	250	
30		240	470	200	70	1,010	1,030	360	250	
31		240		200		720	1,130		280	

NOTE.—Daily discharge determined from rating curves well defined from Feb. 5 to Aug. 10, and fairly well defined from Aug. 11 to Nov. 2.

Monthly discharge of Republican River at Bostwick, Nebr., for 1911.

[Drainage area, 23,300 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			300	0.013	0.02	18,400	D.
February	720	290	459	.020	.02	25,500	C.
March	1,930	240	463	.020	.02	28,500	B.
April	550	160	273	.012	.01	16,200	B.
May	550	200	285	.012	.01	17,500	B.
June	470	70	150	.0064	.007	8,930	B.
July	4,100	25	1,080	.046	05	66,400	B.
August	17,600	550	5,850	.251	.29	360,000	C.
September	3,900	320	708	.030	.03	42,100	C.
October	2,210	250	424	.018	.02	26,100	C.
November	320	250	299	.013	.01	17,800	C.
December			250	.011	.01	15,400	D.
The year	17,600	25	888	.038	.50	643,000	

NOTE.—Discharge Feb. 1 to 4 estimated at 400 second-feet per day. Discharge Nov. 24 to 30 estimated at 300 second-feet. Means for January and December estimated and are only approximate.

BIG BLUE RIVER AT BEATRICE, NEBR.

Location.—At Sixth Street bridge at Beatrice, Nebr. Nearest tributary a small stream entering from the north a mile or more below.

Records available.—October 15, 1910, to December 31, 1911. Records of gage heights have been kept by the United States Weather Bureau from January 1 to July 31 of each year since June 1, 1905.

Drainage area.—3,363 square miles (United States Weather Bureau).

Gage.—Chain gage, owned by the United States Weather Bureau.

Channel.—Shifting.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes some backwater during a portion of the winter months.

Flood discharge.—The highest recorded stage was 25.6 feet above the present gage datum, and occurred May 29, 1903.

Diversions.—Prior to September 1, 1912, there were approved diversions of 841 second-feet for power, from the Big Blue above Beatrice; below, the approved diversions amount to 500 second-feet for power.

Accuracy.—Although the channel is shifting sufficient measurements have been obtained to make estimates of discharge which are fair.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data are furnished.

Discharge measurements of Big Blue River at Beatrice, Nebr., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 21	A. A. Dobson......	1.32	289	July 3	A. B. Price.........	0.75	161
Apr. 7	.....do...............	1.38	305	Aug. 2	.....do..............	1.70	505
May 1	A. B. Price.........	1.60	403	Sept. 16	.....do..............	2.30	839
June 9	.....do...............	1.30	307	Oct. 31	.....do..............	1.50	316

Daily gage height, in feet, and discharge, in second-feet, of Big Blue River at Beatrice, Nebr., for 1910.

[H. E. Palmer, observer.]

Day.	October.		November.		December.		Day.	October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1....	....	....	1.3	325	1.4	365	16....	1.4	365	1.3	325	1.3	325
2....	....	....	1.3	325	1.3	325	17....	1.4	365	1.4	365	1.3	325
3....	....	....	1.3	325	1.3	325	18....	1.6	450	1.4	365	1.3	325
4....	....	....	1.2	290	1.3	325	19....	1.5	405	1.3	325	1.1	260
5....	....	....	1.2	290	1.3	325	20....	1.4	365	1.3	325	1.2	290
6....	....	....	1.2	290	1.3	325	21....	1.3	325	1.3	325	1.3	325
7....	....	....	1.2	290	1.2	290	22....	1.3	325	1.3	325	1.1	260
8....	....	....	1.2	290	1.2	290	23....	1.3	325	1.3	325	1.1	260
9....	....	....	1.3	325	1.2	290	24....	1.2	290	1.3	325	1.1	260
10....	....	....	1.3	325	1.3	325	25....	1.3	325	1.3	325	1.2	290
11....	....	....	1.3	325	1.4	365	26....	1.4	365	1.3	325	1.2	290
12....	....	....	1.3	325	1.3	325	27....	1.4	365	1.3	325	1.2	290
13....	....	....	1.3	325	1.3	325	28....	1.4	365	1.4	365	1.3	325
14....	....	....	1.2	290	1.3	325	29....	1.4	365	1.4	365	1.3	325
15....	1.4	365	1.2	290	1.4	365	30....	1.4	365	1.4	365	1.2	290
							31....	1.4	365	....	....	1.2	290

Daily gage height, in feet, of Big Blue River at Beatrice, Nebr., for 1911.

[H. E. Palmer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.3	1.4	1.4	1.3	1.6	1.1	1.0	1.9	1.7	3.8	1.2	1.4
2	......	1.4	1.5	1.2	1.7	1.2	1.0	1.7	1.5	5.1	1.2	1.0
3	......	1.3	1.4	1.2	1.8	1.1	.9	1.4	1.5	3.6	1.1	1.3
4	......	1.4	1.3	1.3	1.8	1.1	.8	1.3	1.5	2.4	1.0	1.4
5	......	1.4	1.2	1.1	1.8	1.7	.7	1.4	1.5	2.3	1.1	1.4
6	......	1.3	1.3	1.2	1.7	1.2	.8	1.4	1.4	2.2	1.2	1.5
7	......	1.3	1.3	1.3	1.6	1.1	.9	1.4	1.4	2.2	1.2	1.3
8	......	1.2	1.3	1.3	1.5	1.1	1.0	1.9	1.5	2.2	1.2	1.2
9	......	1.2	1.4	1.4	1.4	1.0	1.0	2.4	1.4	2.3	1.2	1.2
10	1.5	1.2	1.4	1.0	1.5	1.1	.9	2.4	2.9	2.2	1.2	1.4
11	1.7	1.3	1.4	1.2	1.7	1.3	.8	2.2	2.0	......	1.1	1.4
12	1.7	1.3	1.4	1.2	1.6	1.1	.9	2.0	2.9	2.3	1.2	1.4
13	1.8	1.3	1.5	1.3	1.4	1.1	.9	2.0	2.5	2.6	1.2	1.4
14	1.8	1.4	1.4	1.3	1.4	1.1	.9	2.1	2.4	3.2	1.2	1.4
15	1.9	1.8	1.3	1.4	1.4	1.1	1.0	1.7	2.4	1.6	1.2	1.3
16	2.1	2.0	1.3	1.3	1.3	1.1	1.0	1.5	2.4	1.4	1.2	1.3
17	2.1	2.2	1.3	1.2	1.3	1.1	1.0	1.4	2.4	1.3	1.2	1.3
18	2.0	2.0	1.3	1.2	1.3	1.0	.8	1.3	2.2	1.4	1.2	1.3
19	1.6	2.1	1.3	1.3	1.3	1.0	.8	1.3	2.2	1.3	1.3	1.4
20	1.4	1.5	1.2	1.3	1.2	.9	1.0	1.4	1.8	1.3	1.3	1.5
21	1.4	1.2	1.2	1.3	1.2	.9	1.0	1.5	1.5	1.3	1.2	1.5
22	1.3	1.5	1.3	1.2	1.2	1.0	.9	1.8	1.4	1.2	1.2	1.5
23	1.3	1.6	1.3	1.3	1.2	1.1	24.0	2.5	1.4	1.1	1.2	1.4
24	1.3	1.7	1.2	1.2	1.2	1.0	(a)	1.7	1.3	1.1	1.2	1.2
25	1.3	1.7	1.3	1.2	1.3	.9	8.7	1.8	1.2	1.0	1.3	1.2
26	1.5	1.6	1.3	1.1	1.3	.8	3.7	1.9	1.3	1.1	1.3	1.3
27	1.4	1.5	1.3	1.3	1.3	.9	3.3	2.0	1.3	1.1	1.2	1.7
28	1.4	1.2	1.2	1.3	1.2	.9	3.1	2.0	1.3	1.2	.5	1.9
29	1.4	......	1.3	1.3	1.2	.9	2.8	2.1	1.3	1.1	.9	1.7
30	1.3	......	1.3	1.8	1.2	.9	2.4	2.0	1.4	1.2	1.0	1.6
31	1.4	......	1.2	......	1.1	......	2.3	1.9	......	1.3	......	......

[a] Gage not read, as trees lodged against the gage.

NOTE.—Ice present Jan. 2 to 18 and Dec. 26 to 31.

Daily discharge, in second-feet, of Big Blue River at Beatrice, Nebr., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	365	365	325	450	260	230	605	500	2,160	290	365
2	......	365	405	290	500	290	230	500	405	3,460	290	230
3	......	325	365	290	550	260	200	365	405	1,960	260	325
4	......	365	325	325	550	260	175	325	405	920	230	365
5	......	365	290	260	550	500	150	365	405	850	260	365
6	......	325	325	290	500	290	175	365	365	780	290	405
7	......	325	325	325	450	260	200	365	365	780	200	325
8	......	290	325	325	405	200	230	605	405	780	290	290
9	......	290	365	365	365	230	230	920	365	850	290	290
10	......	290	365	230	405	260	200	920	1,300	780	290	365
11	......	325	365	290	500	325	175	780	660	815	260	365
12	......	325	365	290	450	260	200	660	1,300	850	290	365
13	......	325	405	325	365	260	200	660	990	1,060	290	365
14	......	365	365	325	365	260	200	720	920	1,580	290	365
15	......	550	325	365	365	260	230	500	920	450	290	325
16	......	660	325	325	325	260	230	405	920	365	200	325
17	......	780	325	290	325	260	230	365	920	325	290	325
18	......	660	325	290	325	230	175	325	780	365	290	325
19	450	720	325	325	325	230	175	325	780	325	325	365
20	365	405	290	325	290	200	230	365	550	325	325	405
21	365	290	290	325	290	200	230	405	405	325	290	405
22	325	405	325	290	290	230	200	550	365	290	290	405
23	325	450	325	325	290	260	22,400	990	365	260	290	365
24	325	500	290	290	290	230	14,700	500	325	260	290	290
25	325	500	325	290	325	200	7,060	550	290	230	325	290
26	405	450	325	260	325	175	2,060	605	325	260	325	......
27	365	405	325	325	325	200	1,670	660	325	260	290	......
28	365	290	290	325	290	200	1,480	660	325	290	310	......
29	365	......	325	325	290	200	1,220	720	325	260	330	......
30	325	......	325	550	290	200	920	660	365	290	350	......
31	365	......	290	......	260	......	850	605	......	325	......	......

NOTE.—Daily discharge determined from a rating curve that is fairly well defined below 1,000 second-feet; discharge estimated Nov. 28 to 30.

Monthly discharge of Big Blue River at Beatrice, Nebr., for 1910–11.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1910.					
October	450	290	361	22,200	C.
November	365	290	323	19,200	B.
December	365	260	310	19,100	B.
1911.					
January	450	....	325	20,000	C.
February	780	290	415	23,000	B.
March	405	290	332	20,400	B.
April	550	260	316	18,800	B.
May	550	260	375	23,100	B.
June	500	175	250	14,900	B.
July	22,400	150	1,830	113,000	C.
August	990	325	560	34,400	B.
September	1,300	290	569	33,900	B.
October	3,460	230	736	45,300	C.
November	350	230	294	17,500	B.
December	405	....	331	20,400	C.
The year	22,400	150	531	385,000	

NOTE.—Discharge Oct. 1 to 14 estimated at 365 second-feet. Discharge Jan. 1 to 18 and Dec. 26 to 31 estimated at 300 and 275 second-feet, respectively.

LITTLE BLUE RIVER NEAR FAIRBURY, NEBR.

Location.—At highway bridge in sec. 26, T. 2 N., R. 2 E., 1½ miles south of Fairbury. Nearest tributary a small stream entering half a mile above.

Records available.—May 23, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain gage; datum unchanged.

Channel.—Shifting.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater for only a short time during the winter months.

Artificial control.—The dam of the Fairbury Roller Mills, located 2 miles above, may control the flow to a certain extent during the low-water season, causing a daily fluctuation. The gage is read once each day.

Diversions.—Prior to September 1, 1912, there were approved diversions of 180 second-feet for power from the Little Blue above Fairbury. There were none below.

Accuracy.—Estimates have been made by indirect method for shifting channels, and can be considered only fair.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data are furnished.

Discharge measurements of Little Blue River near Fairbury, Nebr., in 1911.

Date.	Hydrographer.	Gage-height.	Discharge.	Date.	Hydrographer.	Gage-height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 28	A. A. Dobson	3.52	187	July 12	A. B. Price	2.60	94.7
Mar. 30	do	2.96	129	Aug. 7	do	5.65	926
Apr. 15	do	2.99	145	Sept. 15	do	3.50	300
May 7	D. D. Price	3.20	133	Oct. 31	do	3.00	180
June 8	A. B. Price	2.80	129				

Daily gage height, in feet, of Little Blue River near Fairbury, Nebr., for 1911.

[Clark Hulbert, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.1	3.2	3.3	3.0	4.8	2.9	2.5	3.2	3.5	9.5	3.0	2.9
2	3.2	3.1	3.6	3.0	3.7	2.8	2.4	3.0	3.4	6.4	2.9	3.0
3	......	3.0	3.1	2.9	3.3	2.8	2.6	3.2	3.3	4.1	3.0	3.1
4	......	3.0	3.1	3.0	3.3	2.8	2.5	3.1	3.7	3.5	3.0	3.3
5	......	3.1	3.0	3.0	3.3	3.0	2.4	3.0	3.4	3.3	3.0	3.0
6	......	3.1	3.1	3.1	3.2	2.9	3.2	6.1	3.3	3.3	3.1	3.0
7	......	3.0	3.1	2.9	3.1	2.9	2.5	6.4	3.3	3.2	3.0	3.1
8	......	3.0	3.1	3.0	3.1	2.8	2.4	4.8	3.4	3.1	3.0	2.9
9	3.6	3.0	3.1	2.9	3.9	2.8	2.6	5.3	3.3	3.1	2.9	3.0
10	3.3	3.1	3.1	3.1	3.3	2.9	2.6	5.0	4.3	3.2	2.9	3.1
11	3.5	3.1	3.0	3.1	3.1	2.8	2.7	4.3	3.3	3.1	3.0	3.1
12	3.7	3.0	3.1	3.0	3.1	2.7	2.5	3.9	3.2	3.1	2.8	3.0
13	3.4	3.1	3.0	3.0	3.0	2.8	2.6	3.7	3.2	3.3	3.0	3.0
14	3.9	3.2	3.0	2.9	3.0	2.7	2.7	3.5	3.5	3.1	2.9	3.0
15	3.4	3.1	3.1	3.0	3.1	2.7	2.5	3.4	3.5	3.0	3.1	3.1
16	3.4	3.3	3.1	3.0	3.1	2.7	4.3	3.3	3.4	3.1	3.1	3.1
17	3.7	3.4	3.0	3.0	3.0	2.7	3.5	3.3	3.3	3.1	3.2	3.0
18	3.5	3.4	3.1	3.0	3.0	2.7	3.5	3.2	3.2	3.0	3.1	3.0
19	3.4	3.2	2.9	2.9	2.9	2.8	3.2	3.7	3.1	3.0	2.9	3.0
20	3.2	3.1	3.0	3.0	2.9	2.8	3.6	6.9	3.2	3.1	3.0	3.1
21	3.3	3.1	3.1	2.9	3.0	2.6	3.5	7.25	3.2	3.1	3.0	3.1
22	3.5	3.3	3.1	2.9	3.0	2.7	3.3	9.2[a]	3.0	2.9	3.0	2.9
23	3.6	3.4	3.0	3.0	3.0	2.7	3.2	6.3	3.0	2.8	3.0	3.0
24	3.4	3.4	3.0	2.9	3.0	2.7	8.7	5.8	3.0	2.9	2.9	3.0
25	3.2	3.5	2.9	2.9	2.9	2.6	4.6	5.2	3.0	3.0	3.0	2.9
26	3.2	3.2	3.0	3.0	2.9	2.3	4.4	4.7	3.0	3.0	2.9	3.0
27	3.2	3.1	2.9	3.0	2.9	2.6	4.4	4.2	2.9	3.1	2.9	3.1
28	3.5	3.4	3.0	3.0	2.9	2.6	3.9	4.0	3.0	3.0	2.9	3.1
29	3.1	......	3.0	3.1	2.9	2.5	3.4	3.8	2.9	3.0	3.0	3.1
30	3.4	......	2.9	5.5	3.0	2.5	3.3	3.6	3.2	2.9	2.6	3.4
31	3.2	......	2.9	......	2.9	......	3.2	3.6	......	3.0	......	3.3

[a] Maximum reading, 9.6.

NOTE.—River frozen over Jan. 3 to 8 and Dec. 30 and 31.

Daily discharge, in second-feet, of Little Blue River near Fairbury, Nebr., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	125	150	175	145	450	125	90	200	290	3,340	190	180
2	135	140	220	145	225	115	80	190	270	1,360	180	190
3	144	130	150	130	165	115	100	215	250	420	190	200
4	153	130	150	145	165	115	90	200	320	280	190	230
5	162	140	135	145	165	135	80	190	270	230	190	190
6	171	140	150	160	150	125	175	1,140	250	230	200	190
7	180	130	150	130	140	130	90	1,290	250	215	190	200
8	188	130	150	145	125	120	80	575	270	200	190	180
9	195	130	150	130	250	120	100	770	250	200	180	190
10	150	140	150	160	150	130	100	650	470	215	180	200
11	180	140	135	160	125	120	110	425	250	200	190	200
12	210	130	150	145	125	110	90	330	225	200	170	190
13	165	140	135	145	115	120	110	290	250	230	190	190
14	250	150	135	130	115	110	120	260	300	200	180	190
15	165	140	150	145	125	110	100	245	300	190	200	200
16	165	165	150	135	125	110	380	230	285	200	200	200
17	210	180	135	135	115	110	235	230	270	200	215	190
18	180	180	150	135	130	110	235	215	255	190	200	190
19	165	150	125	125	115	120	190	290	240	190	180	190
20	135	140	135	135	115	120	250	1,640	255	200	190	200
21	150	140	150	125	130	100	235	1,840	255	200	190	200
22	180	165	150	125	130	110	200	3,110	230	180	190	180
23	195	180	135	135	130	110	200	1,300	230	170	190	190
24	165	180	135	125	130	110	2,670	1,040	230	180	180	190
25	135	195	125	125	115	100	490	770	230	190	190	180
26	135	150	135	135	115	70	440	580	230	190	180	190
27	135	140	125	130	115	100	440	430	220	200	180	200
28	180	180	135	130	125	100	320	380	230	190	180	200
29	140	......	135	140	125	90	230	330	220	190	190	200
30	180	......	125	680	135	90	215	290	255	180	150	200
31	150	......	130	......	125	......	200	290	......	190	......	200

NOTE.—Daily discharge determined from a series of parallel rating curves and by the indirect method for shifting channels; discharge interpolated for days for which gage heights are missing.

Monthly discharge of Little Blue River near Fairbury, Nebr., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	250	125	167	10,300	D.
February	195	130	150	8,330	D.
March	220	125	144	8,850	D.
April	680	125	156	9,280	D.
May	450	115	147	9,040	D.
June	135	70	112	6,660	D.
July	2,670	80	272	16,700	D.
August	3,110	190	643	39,500	D.
September	470	220	262	15,600	C.
October	3,340	170	347	21,300	C.
November	215	150	187	11,100	C.
December	230	180	194	11,900	C.
The year	3,340	70	233	169,000	

MISCELLANEOUS MEASUREMENTS.

Miscellaneous measurements in Missouri River drainage basin in 1911.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
Missouri River proper.					
				Feet.	*Sec.-ft.*
Apr. 7[a]	Missouri River	Mississippi River.	Kansas City, Mo.	[b] 8.85	48,700
Upper Missouri drainage basin.					
July 12	Red Rock River	Beaverhead River.	Twitchell's ranch near Monida, Mont.		140
Dearborn River drainage basin.					
Jan. 16	Fish Creek	Dearborn River.	Clemons, Mont.		13
Mar. 20	Middle Fork Dearborn River.	do	Stearns, Mont.		26
June 6	do	do	do		94
Sun River drainage basin.					
Oct. 23	South Fork of North Fork of Sun River.	North Fork of Sun River.	1 mile above the fork near Warm Springs, Mont.	1.06	137
23	North Fork of North Fork of Sun River.	do	do	89.1	127
22	North Fork Sun River.	Sun River	Sun River Canyon, near Augusta, Mont.	76.58	346
Mar. 20	DuBray Creek	South Fork of Sun River.	Highway bridge near Augusta, Mont.		20
June 7	do	do	do		141
Marias River drainage basin.					
May 12	Dupuyer ditch		Above Lake Frances near Valier, Mont.		37
13	Teton Cooperative canal.		Near Strabane, Mont		22
June 21	do		do		128

[a] Made at Hannibal Railroad bridge near foot of Broadway, Kansas City, Mo. Measurement by G. L. Parker.

[b] St. Louis directrix is 303.3 feet below zero of the gage.

Miscellaneous measurements in Missouri River drainage basin in 1911—Continued.

Judith River drainage basin.

Date.		Stream.	Tributary to—	Locality.	Gage height.	Discharge.
					Feet.	*Sec.-ft.*
May	4	Big Spring Creek	Judith River	Lewistown, Mont		185

Milk River drainage basin.

Date.		Stream.	Tributary to—	Locality.	Gage height.	Discharge.
Apr.	18	Wolf Creek ditch		Near Wolf Point, Mont	2.10	0.50
May	17	do		do	2.17	1.7
June	15	do		do	2.17	1.8

Yellowstone River drainage basin.

Date.		Stream.	Tributary to—	Locality.	Gage height.	Discharge.
May	31	East Boulder River	Boulder River.	Near McLeod, Mont	−0.2	15.7
Sept.	5	Bighorn canal		Near headgates near St. Xavier, Mont.	2.6	67
Mar.	30	West Boulder River	Boulder River.	Bruffeys, Mont	1.19	47
Nov.	3	Little Wind River	Popo Agie River.	Near Fort Washakie, Wyo		[a] 35.0
	3	Sage Creek	Little Wind River.	Fort Washakie, Wyo		[a] 10.0
Oct.	15	Popo Agie River	do	Above mouth at Arapahoe, Wyo.		160
	15	Torrey Creek	do	Dubois, Wyo		[a] 25.0
	15	Red Creek	do	do		[a] 5.0
	15	Meadow Creek	do	J. K. Ranch, Wyo		[a] 15.0
Nov.	3	Bull Lake Creek	do	do		[a] 30.0
	4	Dry Creek	Wind River	Crowheart, Wyo		[a] 20.0
June	21	Poison Creek	Bighorn River	Shoshoni, Wyo		[a] 3.0
Oct.	28	South Fork of Paint Rock Creek.	Paint Rock Creek.	Near Hyattville, Wyo		[a] 10.0
	28	East Fork of Paint Rock Creek.	do	do		[a] 10.0
	28	Paint Rock Creek	No Wood Creek.	Below confluence of Southeast Fork of Paint Rock Creek, Wyo.		47.7

White River basin, South Dakota.

Date.		Stream.	Tributary to—	Locality.	Gage height.	Discharge.
Aug.	27	Keya Paha River	White River	Sec. 34, T. 38 N., R. 26 W		9.0
	28	Little White River	do	Sec. 23, T. 41 N., R. 29 W		65

Platte River drainage basin.[b]

Date.		Stream.	Tributary to—	Locality.	Gage height.	Discharge.
June	11	Beaver Creek	North Platte River.	Encampment, Wyo		39.9
	21	do	do	do		35.0
July	12	do	do	do		[a] .8
June	21	Deer Creek	do	Near Glenrock, Wyo		15.0
July	2	Box Elder Creek	do	Careyhurst, Wyo		[a] 3.0
	20	do	do	do		[a] 3.0
June	22	La Prele Creek	do	Near Inez, Wyo		3.0
	22	Elkhorn Creek	do	Near Bona, Wyo		1.0
May	20	Horseshoe Creek	do	Haufs Spur, near Glendo, Wyo	2.00	15.6
	21	do	do	do	1.98	13.5
June	23	do	do	do	1.40	12.0
	22	Cottonwood Creek	do	Badger, Wyo		[a] .5
Oct.	19	do	do	do		[a] 3.0
May	22	Laramie River	do	Uva, Wyo		12.5
June	23	do	do	do		48.9
July	2	do	do	do		4.7
	21	do	do	do		10.7
Oct.	19	do	do	do		[a] 8.0
July	20	Horseshoe Creek	do	Haufs Spur, Wyo		[a] 1.0
Oct.	19	do	do	Cassa, Wyo		[a] 2.0
May	12	North Platte River	Missouri River	Bridgeport, Nebr	[c] 5.25	833
June	26	do	do	do	[c] 5.33	1,220
Apr.	26	do	do	Henry, Nebr	[c] 1.30	640
June	14	do	do	do	[c] 2.05	1,220

[a] Discharge estimated.

[b] See also p. 235.

[c] Gage height from State gage.

Miscellaneous measurements in Missouri River drainage basin in 1911—Continued.

Platte River drainage basin—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Jan. 10	North Fork of South Platte River.	South Platte River.	South Platte, Colo.	[a] 2.52	46.1
Feb. 22	.....do	.....do	.....do	[a] 1.96	29.9
Mar. 16	.....do	.....do	.....do	[a] 1.00	52.4
May 10	.....do	.....do	.....do	2.75	269
Aug. 18	.....do	.....do	.....do	2.00	116
29	.....do	.....do	.....do	1.90	83.4
Nov. 4	.....do	.....do	.....do	1.62	46.1
Dec. 16	.....do	.....do	.....do	[a] 2.70	28.8
Apr. 14	Threemile Creek	Geneva Creek	Near Grant, Colo.		1.4
July 13	.....do	.....do	.....do		7.7
Sept. 8	Geneva Creek	North Fork of South Platte River.	Grant, Colo.		33.4
8	.....do	.....do	.....do		33.5
July 14	Craig Park Creek	.....do	Estabrook, Colo.		[b] 9.0
12	Ditch at Cassells, Colo.	From North Fork of South Platte River.	Cassells, Colo.		12.5
12	.....do	Brandy Creek power house.	.....do		.6
	.....do	Total flow			13.1
	.....do	Waste			.3
	.....do	Water to turbine.			12.8
Apr. 13	Deer Creek	North Fork of South Platte River.	Crossons, Colo.		[b] 4.0
14	.....do	.....do	.....do		[b] 5.0
July 4	.....do	.....do	.....do		[b] 5.0
5	.....do	.....do	.....do		[b] 7.0
14	.....do	.....do	.....do		[b] 8.0
Apr. 14	Elk Creek	.....do	Pine Grove, Colo.		[b] 4.0
July 4	.....do	.....do	.....do		[b] 5.0
Apr. 14	Buffalo Creek	.....do	Near Buffalo, Colo.		[b] 4.0
July 12	.....do	.....do	.....do		[b] 2.0
July 27	Tarryall Creek	South Platte River.	Robbins ranch, near Jefferson, Colo.	.95	49.8
9	Twin Creek	.....do	Lake George, Colo.		[b] .25
12	Turkey Creek	.....do	Pine Grove, Colo.		[b] 7.0
12	Chicago Creek	.....do	Idaho Springs, Colo.		[b] 4.0
12	Soda Creek	.....do	.....do		[b] 4.0
Sept. 23	North Fork of Clear Creek.	.....do	Mouth at Empire station, Colo.		[b] 10.0
23	Middle Fork of Clear Creek.	.....do	Mouth at Georgetown, Colo.		[b] 50.0
23	South Fork of Clear Creek.	.....do	.....do		[b] 50.0
Mar. 1	North Clear Creek	Clear Creek	Forkscreek, Colo.		[b] 3.0
13	.....do	.....do	.....do		25.7
June 29	.....do	.....do	.....do		[b] 7.0
Aug. 12	.....do	.....do	.....do		[b] 5.0
Sept. 23	.....do	.....do	.....do		[b] 6.0
Nov. 8	.....do	.....do	.....do		[b] 8.0
Dec. 22	.....do	.....do	.....do		[b] 1.0
May 13	Roscoe Creek	.....do	10 miles above Golden, Colo.		0
13	Elk Creek	.....do	8 miles above Golden, Colo.		[b] .5
13	Beaver Creek	.....do	7½ miles above Golden, Colo.		[b] 2.0
Sept. 22	.....do	.....do	.....do		0
Nov. 8	.....do	.....do	.....do		[b] .5
Sept. 22	Golden Creek	.....do	Golden, Colo.		0
Dec. 22	Clear Creek	South Platte River.	.....do		[b] 15.0
Oct. 1	South Boulder Creek	.....do	Pine Cliff, Colo.		[b] 10.0
1	.....do	.....do	Rollinsville, Colo.		[b] 15.0
1	Lump Gulch Creek	South Boulder Creek.	.....do		[b] 3.0
Apr. 1	Lonetree Creek	Clear Creek	Greeley, Colo.		[b] 1.0
1	Crow Creek	.....do	Kersey, Colo.		0

[a] Ice conditions.

[b] Estimated.

The following measurements of streams and ditches along North Platte River from the Wyoming State line to Kearney, Nebr., were made by R. H. Fletcher from September 15 to October 12, 1911. The capacity of the ditches was determined by Kutter's formulas, values of $N=0.020$ to 0.030, values of $S=0.0005$ to 0.002. For ditches that were dry the value of S was determined by levels taken to high-water marks in ditches.

Measurements of streams and irrigation ditches along North Platte River from Wyoming State line to Kearney, Nebr., in 1911.

Date.	Stream or ditch.	Location.	Discharge.	Capacity.
			Second-feet.	*Second-feet.*
Sept. 15	North Platte River	Henry, Nebr	1,007	
15	do	Morrill, Nebr	513	
17	do	Mitchell, Nebr	710	
18	do	Scottsbluff, Nebr	879	
19	do	Minatare, Nebr	699	
21	do	Bayard, Nebr	573	
22	do	Bridgeport, Nebr	457	
24	do	Lisco, Nebr	529	
25	do	Oshkosh, Nebr	559	
27	do	Lewellen, Nebr	646	
29	do	Keystone, Nebr	638	
Oct. 6	do	North Platte, Nebr	3,505	
10	do	Gothenburg, Nebr	2,408	
12	do	Kearney, Nebr	1,492	
Sept. 16	Dry Sheep Creek	Morrill, Nebr	19	
27	Blue Creek	Lewellen, Nebr	84	
27	do	do	(mouth) Dry.	
28	Otter Creek	Le Moyne, Nebr	Est. 15	
28	Lonergan Creek	do	Est. 4	
28	Spring or Sand Creek	do	Est. 2	
28	Whitetail Creek	Keystone, Nebr	Est. 12	
14	Mitchell ditch	Henry, Nebr. (highway)	118	276
14	do	Henry, Nebr. (head gate)	120	289
14	Gering ditch	Henry, Nebr	130	268
15	Tri-State ditch	do	432	1,359
16	do	Morrill, Nebr	417	1,053
17	do	Mitchell, Nebr	395	
15	Ramshorn ditch	Morrill, Nebr	Dry.	75
16	Enterprise ditch	Morrill, Nebr. (head gate)	Dry.	328
17	do	Mitchell, Nebr. (1 mile below head gate).	24	118
16	do	Morrill, Nebr	Est. 20	
17	Winters Creek ditch	Scotts Bluff, Nebr		213
17	Homestead ditch	do	Abandoned.	
18	Central Irrigation and Power ditch.	Opposite Scotts Bluff, Nebr. (head gate).	Dry.	49
18	do	Gering, Nebr. (below wasteway).	Dry.	46
18	Steamboat ditch	Minatare, Nebr	Dry.	118
18	Castlerock ditch	do	60	210
19	Minatare ditch	do	Dry.	178
19	North Fork Minatare ditch	do	Dry.	92
19	South Fork Minatare ditch	do	Dry.	58
19	Ninemile ditch	do	91	238
19	Short Line ditch	Bayard, Nebr	Dry.	41
20	Chimneyrock ditch	do	Est. 15	143
20	Alliance ditch	do	45	99
20	Belmont ditch	do	72	255
22	do	Bridgeport, Nebr	50	133
20	Empire ditch	Bayard, Nebr	Dry.	23
21	Schemerhorn ditch	Northport, Nebr	Dry.	57
21	H. T. Clark ditch	do	Dry.	Abandoned.
21	Browns Creek ditch	do	79	163
23	Beerline ditch	Broadwater, Nebr	Dry.	49
23	Lees Creek ditch	do	Dry.	13
23	Lisco Irrigation Co. ditch	Lisco, Nebr	Dry.	154
24	Hannah ditch	do	Dry.	Abandoned.
24	Rush Creek ditch	do	Dry.	26
25	Wilcox ditch	do	Dry.	Abandoned.
25	Spohn ditch	Oshkosh, Nebr	Dry.	35
25	Lyons ditch	do	Dry.	Abandoned.
25	Oshkosh or Robinson Gumaer ditch.	do	Dry.	31

Measurement of streams and irrigation ditches along North Platte River from Wyoming State line to Kearney, Nebr., in 1911—Continued.

Date.	Stream or ditch.	Location.	Discharge.	Capacity.
			Second-feet.	*Second-feet.*
25	Gyger ditsh	Oshkosh, Nebr	Dry.	Abandoned.
26	Roberts or Midland ditch	do	17	Full capacity.
26	Overland ditch	do	Dry.	Abandoned.
26	Bushnell ditch	do	Dry.	Abandoned.
26	Signal Bluff ditch	do	Dry.	Abandoned.
28	Robins-Williams ditch	Lewellen, Nebr	Dry.	Abandoned.
26	Alfalfa Irrigation ditch	do	Est. 12	72
27	Vance-Orr ditch	do	Est. 2	17
28	Holcomb ditch	Le Moyne, Nebr	Dry.	Abandoned.
28	Meyers-Phelas ditch	Martin, Nebr	Dry.	Abandoned.
28	Fernstrom or Nisson ditch	do	Dry.	Abandoned.
29	Southerland or Paxton ditch	Keystone, Nebr	73	171
29	Sheridan or Wilson ditch	Sarben, Nebr	Dry.	Abandoned.
Oct. 1	South Side ditch	Southerland, Nebr	Dry.	Abandoned.
1	North Platte or old ditch canal	do	83	189
1	Hershey ditch	do	83	Full capacity.
2	Farmers-Merchants or Suburban ditch.	Hershey, Nebr	Dry.	145
9	Gothenburg ditch	Brady, Nebr	82	265
11	Farmers and Merchants ditch	Cozad, Nebr	Dry.	306
12	Kearney ditch	Kearney, Nebr	86	546

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Date.	Stream or ditch.	Location.	Discharge.	Capacity.
Sept. 27	Ramsey ditch	Lewellen, Nebr	Est. 7	Est. 75
27	Equitable, etc., ditch	do	35	Full capacity.
27	Iowa Improvement Irrigation ditch.	do	About 2	Est. 30
26	Meeker or Graf ditch	do	26	Full capacity.

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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 307

SURFACE WATER SUPPLY OF THE UNITED STATES

1911

PART VII. LOWER MISSISSIPPI RIVER BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

W. B. FREEMAN AND H. J. DEAN

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SURFACE WATER SUPPLY OF THE LOWER MISSISSIPPI RIVER BASIN, 1911.

By W. B. FREEMAN and H. J. DEAN.

AUTHORIZATION OF WORK.

This volume is Part VII of a series of 12 reports presenting results of measurements of flow made on certain streams in the United States during the calendar year 1911. The reports are listed in the following table:

Papers on surface water supply of the United States, 1911.

Part.[a]	No.	Title.
I	301	North Atlantic coast.
II	302	South Atlantic coast and eastern Gulf of Mexico.
III	303	Ohio River basin.
IV	304	St. Lawrence River basin.
V	305	Upper Mississippi River and Hudson Bay basins.
VI	306	Missouri River basin.
VII	307	Lower Mississippi River basin.
VIII	308	Western Gulf of Mexico.
IX	309	Colorado River basin.
X	310	Great Basin.
XI	311	Pacific coast in California.
XII	312	North Pacific coast.

[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394) which contains the following paragraph:

> *Provided*, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation.

Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work many private and State organizations have cooperated. Acknowledgement for such cooperation is made on page 13 and also in connection with the description of each station affected by the cooperative work.

PUBLICATIONS.

Measurements of stream flow have been made at more than 2,000 points in the United States and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1911 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points in the United States, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular surface water supply papers from time to time. A complete list of the gaging stations maintained by the Survey to and including 1910 and a list of the papers relating to the water supply of the country has been published as Water-Supply Paper 280. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119.

For each calendar year there has been prepared a report embodying the stream-flow data collected during that year, which has been published either as a part of the annual report of the Director, as a bulletin, or as a water-supply paper, as shown by the following table:

Stream-flow data in reports of the United States Geological Survey.

[A = Annual Report; B = Bulletin; WS = Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 2	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	do	1903.
WS 124 to 135	do	1904.
WS 165 to 178	do	1905.
WS 201 to 214	Complete data, except descriptions	1906.
WS 241 to 252	Complete data	1907–8.
WS 261 to 272	do	1909.
WS 281 to 292	do	1910.
WS 301 to 312	do	1911.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1911. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1911, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, and 301, which contain records for the New England streams from 1903 to 1911.

Number of water-supply papers containing results of stream measurements, 1899–1911.

	1899 [a]	1900 [b]	1901	1902	1903	1904
North Atlantic coast (St. John River to York River)	35	47, [c] 48	65, 75	82	97	[d] 124, [e] 125, [f] 126
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[g] 35, 36	48	65, 75	[g] 82, 83	[g] 97, 98	[f] 126, 127
Ohio River basin	36	48, [h] 49	65, 75	83	98	128
St. Lawrence River and Great Lakes	36	49	65, 75	[i] 82, 83	97	129
Hudson Bay and upper Mississippi River	36	49	[j] 65, 66, 75	[j] 83, 85	[j] 98, 99, [k] 100	[j] 128, 130
Missouri River	[l] 36, 37	49, [m] 50	66, 75	84	99	130, [n] 131
Lower Mississippi River	37	50	[j] 65, 66, 75	[j] 83, 84	[j] 98, 99	[j] 128, 131
Western Gulf of Mexico	37	50	66, 75	84	99	132
Colorado River	[o] 37, 38	50	66, 75	85	100	133
Great Basin	38, [q] 39	51	66, 75	85	100	133, [r] 134
Pacific coast in California	38, [s] 30	51	66, 75	85	100	134
North Pacific coast	38	51	66, 75	85	100	135

	1905	1906	1907–8	1909	1910	1911
North Atlantic coast (St. John River to York River)	[d] 165, [e] 166, [f] 167	[d] 201, [e] 202, [f] 203	241	261	281	301
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[f] 167, 168	[f] 283. 204	242	262	282	302
Ohio River basin	169	205	243	263	283	303
St. Lawrence River and Great Lakes	170	206	244	264	284	304
Hudson Bay and upper Mississippi River	171	207	245	265	285	305
Missouri River	172	208	246	266	286	306
Lower Mississippi River	[j] 169, 173	[j] 205, 209	247	267	287	307
Western Gulf of Mexico	174	210	248	268	288	308
Colorado River	175, [p] 177	211	249	269	289	309
Great Basin	176, [r] 177	212, [r] 213	250, [r] 251	270, [r] 271	290	310
Pacific coast in California	177	213	251	271	291	311
North Pacific coast	[t] 177, 178	214	252	272	292	312

[a] Rating tables and index to Water-Supply Papers 35–39 continued in Water-Supply Paper 39.

[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

[c] Wissahickon and Schuylkill rivers to James River.

[d] New England rivers only.

[e] Hudson River to Delaware River, inclusive.

[f] Susquehanna River to Yadkin River, inclusive.

[g] James River only.

[h] Scioto River.

[i] Lake Ontario and tributaries to St. Lawrence River proper.

[j] Tributaries of Mississippi from east.

[k] Hudson Bay only.

[l] Gallatin River.

[m] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

[n] Platte and Kansas rivers.

[o] Green and Gunnison rivers and Grand River above junction with Gunnison.

[p] Below junction with Gila.

[q] Mohave river only.

[r] Great Basin in California, excepting Truckee and Carson drainage basins.

[s] Kings and Kern rivers and south Pacific coast drainage basins.

[t] Rogue, Umpqua, and Siletz rivers only.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches, and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off in depth in inches, and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the accompanying table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off, depth in inches," is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge (second-feet per square mile).	Run-off (depth in inches).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.........	0.03719	1.041	1.079	1.116	1.153
2.........	.07438	2.083	2.157	2.231	2.306
3.........	.11157	3.124	3.236	3.347	3.459
4.........	.14876	4.165	4.314	4.463	4.612
5.........	.18595	5.207	5.393	5.578	5.764
6.........	.22314	6.248	6.471	6.694	6.917
7.........	.26033	7.289	7.550	7.810	8.070
8.........	.29752	8.331	8.628	8.926	9.223
9.........	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for 1 day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge (second-feet).	Run-off (acre-feet).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.........	1.983	55.54	57.52	59.50	61.49
2.........	3.967	111.1	115.0	119.0	123.0
3.........	5.950	166.6	172.6	178.5	184.5
4.........	7.934	222.1	230.1	238.0	246.0
5.........	9.917	277.7	287.6	297.5	307.4
6.........	11.90	333.2	345.1	357.0	368.9
7.........	13.88	388.8	402.6	416.5	430.4
8.........	15.87	444.3	460.2	476.0	491.9
9.........	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply values for 1 day by the number of days.

1 second-foot equals 40 California miner's inches (law of March 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.

1 second-foot for one year equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one day equals 86,400 cubic feet.

1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.

100 California miner's inches equals 18.7 United States gallons per second.

100 California miner's inches for one day equals 4.96 acre-feet.

100 Colorado miner's inches equals 2.60 second-feet.

100 Colorado miner's inches equals 19.5 United States gallons per second.

100 Colorado miner's inches for one day equals 5.17 acre-feet.

100 United States gallons per minute equals 0.223 second-foot.

100 United States gallons per minute for one day equals 0.442 acre-foot.

1,000,000 United States gallons per day equals 1.55 second-feet.

1,000,000 United States gallons equals 3.07 acre-feet.

1,000,000 cubic feet equals 22.95 acre-feet.

1 acre-foot equals 325,850 gallons.

1 inch deep on 1 square mile equals 2,323,200 cubic feet.

1 inch deep on 1 square mile equals 0.0737 second-foot per year.

1 foot equals 0.3048 meter.

1 mile equals 1.60935 kilometers.

1 mile equals 5,280 feet.

1 acre equals 0.4047 hectare.

1 acre equals 43,560 square feet.

1 acre equals 209 feet square, nearly.

1 square mile equals 2.59 square kilometers.

1 cubic foot equals 0.0283 cubic meter.

1 cubic foot of water weighs 62.5 pounds.

1 cubic meter per minute equals 0.5886 second-foot.

1 horsepower equals 550 foot-pounds per second.

1 horsepower equals 76.0 kilogram-meters per second.

1 horsepower equals 746 watts.

1 horsepower equals 1 second-foot falling 8.80 feet.

1⅓ horsepower equal about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data, so far as available, are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharge, table of monthly and yearly discharge and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also, information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, so that readings of negative values shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage heights and daily discharge as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant except for known backwater periods.

The table of daily discharge gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on pages 8–9, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909."

Plates I and II show the average precipitation and run-off in the United States, as determined from the measurements of stream flow made by the Geological Survey and records of rainfall collected by the Weather Bureau.

Plate III shows typical gaging stations.

Plate IV shows current meters[1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions of the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation o stage; second, to errors in measurements of flow; third, to errors du to misinterpretation of stage and flow data.

In order to give engineers and others information regarding th probable accuracy of the computed results, footnotes are added to th daily discharge tables, stating the probable accuracy of the ratin tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates, i general, that the rating is probably accurate within 5 per cent; "fairl well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general an are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does no apply to the maximum or minimum nor to any individual day, but t the monthly mean. It is based on the accuracy of the rating, th probable reliability of the observer, and knowledge of local conditions

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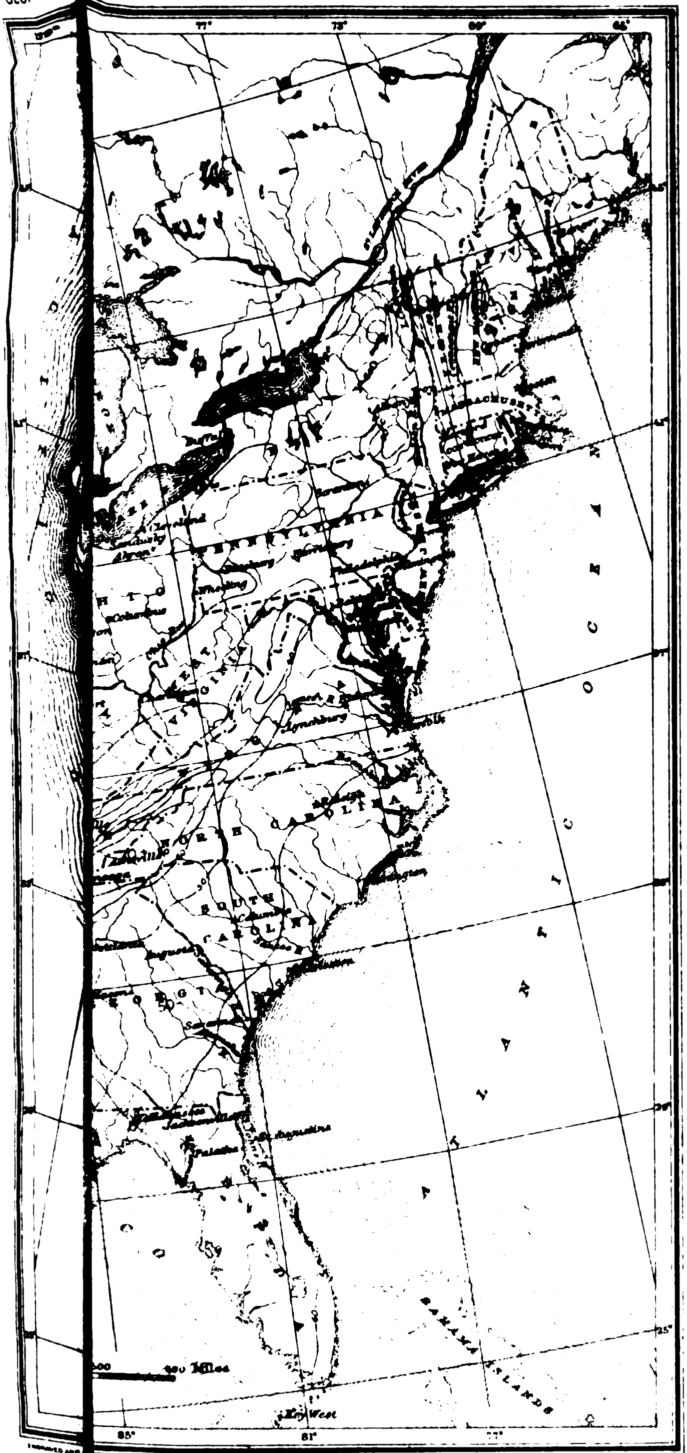
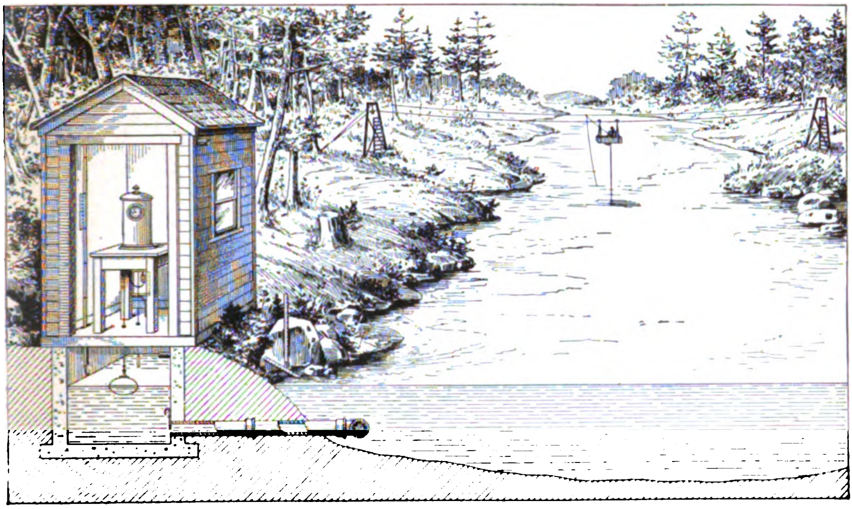
[1] See Hoyt, J. C., and others, Use and care of current meter as practiced by the United States Geologic Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

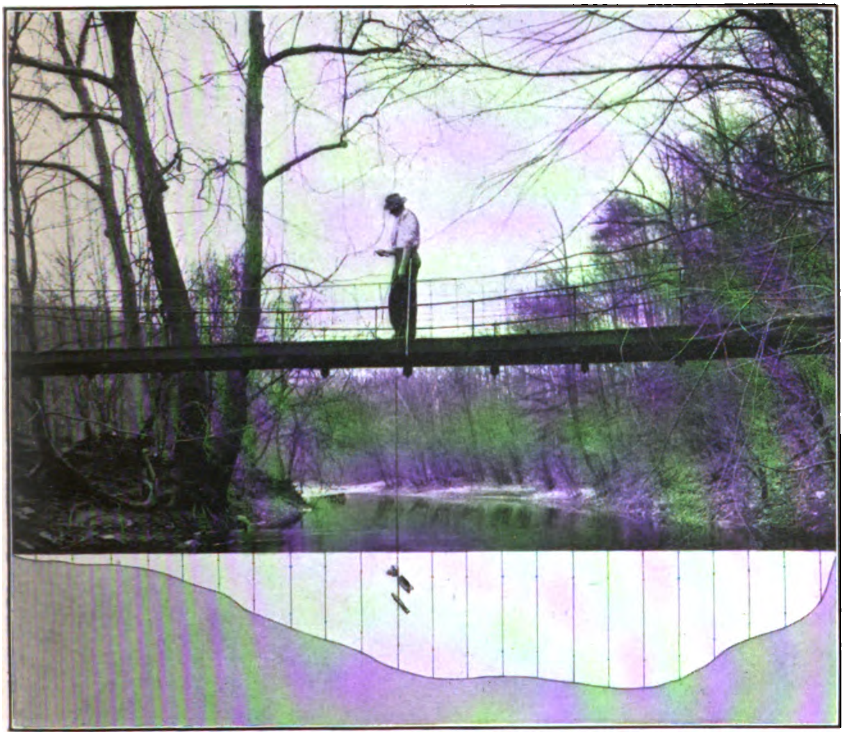


TION

Prepared by Henry Gannett
mainly from data of the
United States Geological Survey
and United States Weather Bureau

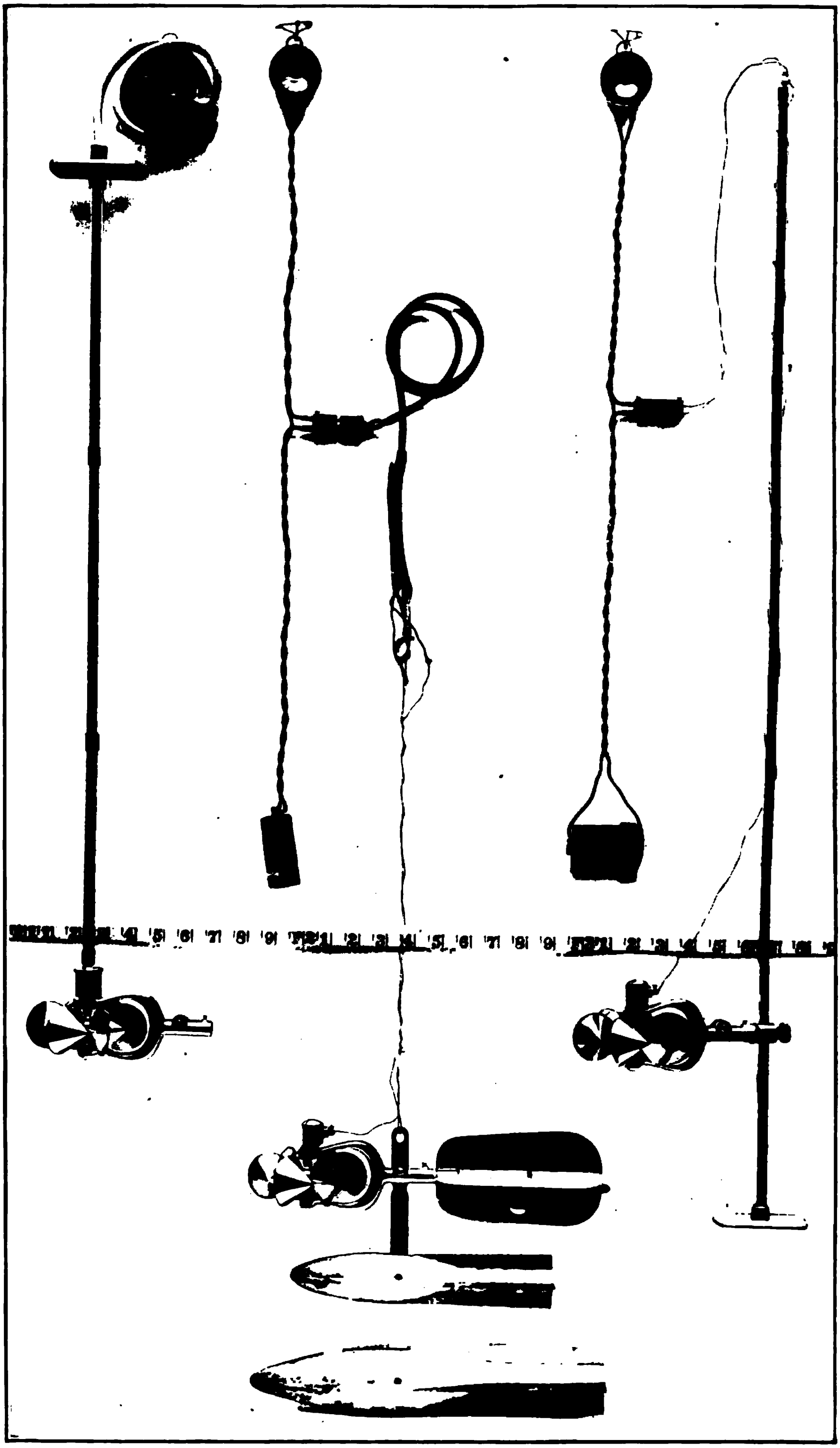


A. CABLE STATION WITH AUTOMATIC GAGE.



B. FOR BRIDGE MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should, therefore, be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general the base data collected each year by the Survey engineers are published not only to comply with the law but to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION AND ACKNOWLEDGMENTS.

The work in Colorado was carried on in cooperation as follows:

The United States Forest Service furnished the services of a hydrographer for measuring the streams in the national forests, and also furnished the gage heights.

Mr. C. W. Comstock, State engineer, furnished the field data on a number of stations on Arkansas River and cooperated in the maintenance of other stations. He also furnished complete records at several stations.

The Central Land & Irrigation Co. paid the field expenses incurred at the stations in the Big Sandy basin.

The work in New Mexico was carried on in cooperation with Mr. C. D. Miller, Territorial engineer, who paid the field expenses incurred at most of the stations. Cooperation with the Atchison, Topeka & Santa Fe Railway Co. and with individuals was arranged by the Territorial engineer.

The work in Mississippi was carried on in cooperation with the Tallahatchie Drainage Commission.

DIVISION OF WORK.

The field data in Colorado were collected under the direction of W. B. Freeman, district engineer, who was assisted by G. A. Gray, E. O. Christiansen, J. B. Stewart, G. H. Russell, O. M. Wimmer, and H. B. Waha. Assistance in New Mexico was also rendered by R. L. Cooper and C. B. Digby, of the Territorial engineer's office.

The field data in the Yazoo River basin were collected by engineers of the Tallahatchie Drainage Commission.

The rating curves, except those for certain stations, the data for which were furnished completely by the State of Colorado, were made by W. B. Freeman, M. R. Hall, and H. J. Dean. The computations were made by G. A. Gray, H. J. Dean, C. L. Batchelder, M. I. Walters, and G. A. Wallace.

The manuscript was edited by Mrs. B. D. Wood.

GAGING-STATION RECORDS.

ARKANSAS RIVER BASIN.

EAST FORK OF ARKANSAS RIVER NEAR LEADVILLE, COLO.

Location.—At highway bridge in sec. 16, T. 9 S., R. 80 W., about 300 yards above mouth of Tennessee Fork, in Leadville National Forest, 3 miles northwest of Leadville.

Records available.—April to August 31, 1890; June 18 to September 29, 1903; June 5, 1911, to December 31, 1911.

Drainage area.—52 square miles, measured from topographic sheet.

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There is a court decree for a diversion of 2 second-feet above the station.

Accuracy.—Conditions are favorable for accurate results, and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of East Fork of Arkansas River near Leadville, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 5	O. M. Wimmer	0.95	188
July 11	.....do	.65	106
Aug. 2	.....do	.35	38.9
Sept. 14	.....do	.20	14.2
Dec. 25	H. B. Waha [a]	1.30	10.2

[a] Ice on stream. Discharge obtained by subtracting the discharge of Tennessee Fork from the discharge of Arkansas River below the confluence with the Tennessee Fork.

Daily gage height, in feet, of East Fork of Arkansas River near Leadville, Colo., for 1911.

[M. F. Frey, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1							
2		0.85	0.45				
3						0.8	
4		.8					
5	1.0			0.2			
6					0.35		
7		.8					
8						.45	
9		.75					0.7
10			.4				
11		.65	.35				
12							
13	.85						
14			.3	.2	.2		
15							
16		.55	.3		.15		
17			.25			.5	
18	.8		.25				.6
19							
20							
21	.8					.6	
22		.6					
23		.6			.5		
24	.85						
25	.8						1.3
26		.45					
27	.45		.25				
28			.25				
29				.2			
30							
31							

NOTE.—Gage heights affected by ice from Oct. 23 to Dec. 31, 1911.

Daily discharge, in second feet, of East Fork of Arkansas River near Leadville, Colo., for 1911.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1							
2		162	60				
3							
4		148					
5	205			14			
6					40		
7		148					
8							
9		134					
10			49				
11		107	40				
12							
13	162						
14			30	14	14		
15							
16		82	30		9		
17			22				
18	148		22				
19							
20							
21	148						
22		94					
23		94					
24	162						
25	148						10
26		60					
27	60		22				
28			22				
29				14			
30							
31							

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Oct. 23 to Dec. 31, 1911, not determined on account of ice.

ARKANSAS RIVER AT GRANITE, COLO.

Location.—At Granite, in sec. 31, T. 11 S., R. 79 W.; below the mouth of Lake Creek and above Lost Canyon and Clear creeks.

Records available.—May 1, 1897, to September 10, 1899; April 6, 1910, to December 31, 1911.

Drainage area.—425 square miles.

Gage.—Automatic recording gage established in 1910; datum of recording gage bears no determined relation to that of the vertical staff gage which was used from 1897 to 1899 and which was located at the highway bridge near the railroad station.

Channel.—Practically permanent.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Artificial control.—The discharge is affected by the operation of the Twin Lakes reservoir and by a flume used to carry water from Lake Creek to a point below the station.

Diversions.—There are court decrees for diversions of 76 second-feet from the Arkansas between this station and the junction of Tennessee and East forks, and diversions of 22 second-feet from the intervening tributaries.

Cooperation.—Since 1910 this station has been maintained and records have been furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River at Granite, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 27[a]	Grieve and Clayton	2.90	79	July 24	Thos. Grieve	2.75	66
Feb. 25[a]	Thos. Grieve	2.90	65	Aug. 10	Hezmalhalch and Bunger	2.30	399
Mar. 24	do	1.42	96	Sept. 12	M. E. Bunger	1.85	20
Apr. 19	do	1.67	148	Oct. 11	do	1.84	199
May 11	do	3.00	848	Dec. 12[a]	do	1.40	45
June 20	C. C. Hezmalhalch	3.60	1,400				

[a] Ice in stream.

Daily gage height, in feet, of Arkansas River at Granite, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	......	......	1.5	2.45	3.3	3.15	2.85	2.0	1.9	1.65	1.6
2	......	......	......	1.55	2.4	3.4	3.2	2.75	2.0	1.8	1.65	1.7
3	......	......	......	1.55	2.3	3.4	3.45	2.75	2.0	1.75	1.55	1.6
4	......	......	......	1.35	2.6	3.45	3.4	2.85	1.95	1.7	1.6	1.6
5	......	......	......	1.4	2.6	3.6	3.5	2.7	1.9	2.0	1.6	1.65
6	......	......	......	1.4	2.8	3.7	3.1	2.55	1.85	2.0	1.6	1.65
7	......	......	......	1.4	2.85	3.7	2.85	2.5	1.8	1.85	1.55	1.6
8	......	......	......	1.45	2.95	3.8	3.1	2.0	1.8	1.85	1.6	1.6
9	......	......	......	1.45	3.2	3.85	3.25	2.15	1.85	1.9	1.55	1.6
10	......	......	......	1.5	3.2	3.8	3.25	2.25	1.85	1.9	1.65	1.6
11	......	......	......	1.5	2.9	3.7	3.1	2.45	1.85	1.9	1.6	1.6
12	......	......	1.5	1.5	2.7	3.75	2.95	2.3	1.9	1.8	1.55	1.6
13	......	......	1.5	1.4	2.65	3.6	2.9	2.45	2.05	1.85	1.8	1.6
14	......	......	1.5	1.45	2.7	3.6	2.85	2.4	2.05	1.95	1.75	......
15	......	......	1.5	1.65	2.8	3.8	2.8	2.3	2.10	2.0	1.65	......
16	......	......	1.45	1.6	2.7	3.65	2.75	2.15	2.05	1.95	1.7	......
17	......	......	1.5	1.65	2.9	3.6	2.75	2.2	2.15	1.9	1.65	......
18	......	......	1.4	1.65	2.85	3.55	2.85	2.15	2.05	1.9	1.65	......
19	......	......	1.4	1.8	2.9	3.55	2.85	2.65	1.90	1.9	1.65	......
20	......	......	1.45	1.8	2.7	3.6	2.8	2.75	1.95	1.9	1.65	......
21	......	......	1.5	1.9	2.6	3.6	2.8	2.85	1.95	1.95	1.6	......
22	......	......	1.45	1.9	2.5	3.6	2.75	2.85	1.9	1.95	1.55	......
23	......	......	1.45	1.95	2.65	3.55	2.7	2.6	1.9	1.9	1.5	......
24	......	......	1.5	1.9	2.7	3.4	2.7	2.6	1.85	1.85	1.5	......
25	......	......	1.45	1.9	2.8	3.3	2.55	2.9	1.8	1.75	1.55	......
26	......	......	1.35	1.8	3.0	3.25	2.55	2.3	1.75	1.7	1.65	......
27	......	......	1.3	2.1	3.0	3.25	2.6	2.65	1.7	1.7	1.6	......
28	......	......	1.35	2.2	3.1	3.4	2.65	2.15	1.65	1.65	1.55	......
29	......	......	1.35	2.4	3.1	3.35	2.6	2.2	1.7	1.65	1.55	......
30	......	......	1.4	2.45	3.15	3.2	2.55	2.3	1.8	1.65	1.55	......
31	......	......	1.45	......	3.1	......	2.5	2.0	......	1.65	......	......

NOTE.—Gage heights affected by ice Jan. 1 to Mar. 11 and Dec. 3 to 31, 1911.

Daily discharge, in second-feet, of Arkansas River at Granite, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	75	75	70	100	470	1,140	995	740	255	215	135	70
2	75	75	70	110	440	1,240	1,040	665	255	180	135	70
3	75	75	70	110	390	1,240	1,290	665	255	165	110	70
4	75	75	75	72	560	1,290	1,240	740	235	150	120	60
5	75	75	75	80	560	1,450	1,340	630	215	255	120	60
6	75	75	85	80	700	1,560	950	530	198	255	120	60
7	75	75	85	80	740	1,560	740	500	180	198	110	60
8	75	75	85	90	820	1,670	950	255	180	198	120	45
9	75	75	95	90	1,040	1,730	1,090	318	198	215	110	45
10	75	75	95	100	1,040	1,670	1,090	365	198	215	135	45
11	75	75	95	100	780	1,560	950	470	198	215	120	45
12	75	70	100	100	630	1,615	820	390	215	180	110	45
13	75	70	100	80	595	1,450	780	470	275	198	180	45
14	75	70	100	90	630	1,450	740	440	275	235	165	45
15	75	70	100	135	700	1,670	700	390	295	255	135	45
16	75	70	90	120	630	1,505	665	318	275	235	150	45
17	80	70	100	135	780	1,450	665	340	318	215	135	45
18	80	70	80	135	740	1,395	740	318	275	215	135	45
19	80	70	80	180	780	1,395	740	595	215	215	135	45
20	80	65	90	180	630	1,450	700	665	235	215	135	45
21	80	65	100	215	560	1,450	700	740	235	235	120	45
22	80	65	90	215	500	1,450	665	740	215	235	110	45
23	80	65	90	235	595	1,395	630	560	215	215	100	45
24	80	65	100	215	630	1,240	630	560	198	198	100	45
25	80	65	90	215	700	1,140	530	780	180	165	90	45
26	80	65	72	180	860	1,090	530	390	165	150	90	45
27	80	65	65	295	860	1,090	560	595	150	150	90	45
28	80	65	72	340	950	1,240	595	318	135	135	80	45
29	80	......	72	440	950	1,190	560	340	150	135	80	45
30	80	......	80	470	995	1,040	530	390	180	135	80	45
31	80	......	90	......	950	......	500	255	......	135	......	45

NOTE.—Daily discharge, Jan. 1 to Mar. 11 and Dec. 3 to 31, estimated on account of ice.

Monthly discharge of Arkansas River at Granite, Colo., for 1911.

[Drainage area, 425 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	80	75	77	0.181	0.21	4,740
February	75	65	70	.165	.17	3,890
March	100	65	86	.202	.23	5,290
April	470	72	166	.391	.44	9,880
May	1,040	390	716	1.68	1.94	43,700
June	1,730	1,040	1,290	3.04	3.39	83,900
July	1,340	500	796	1.87	2.16	48,700
August	780	255	499	1.17	1.35	30,700
September	318	135	219	.515	.57	13,000
October	255	135	197	.464	.53	12,100
November	180	80	118	.278	.31	7,050
December	70	45	49	.115	.13	3,040
The year	1,730	45	367	.864	11.43	265,000

NOTE.—No accuracy notes given, as the entire record was furnished by the State engineer of Colorado.

ARKANSAS RIVER AT SALIDA, COLO.

Location.—At Salida, Colo., some distance above the mouth of South Fork of Arkansas River, the nearest tributary of importance.

Records available.—April 11, 1895, to October 31, 1903; November 3, 1909, to December 31, 1911.

Drainage area.—1,160 square miles.

Gage.—Automatic recording gage. No determined relation between automatic gage and the gage used from 1895 to 1903.

Channel.—Rough; somewhat shifting.

Winter flow.—Springs keep the river open during the winter months.

Diversions.—There are court decrees for diversions of 148 second-feet from the Arkansas between this station and Granite, and diversions of 380 second-feet from intervening tributaries.

Cooperation.—Since 1909 this station has been maintained and records have been furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River at Salida, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 27	Thos. Grieve	0.56	213	June 22	C. C. Hezmalhalch	4.79	2,990
28	B. S. Clayton	.58	209	Aug. 11	Hezmalhalch and Bunger	1.90	790
Feb. 25	Thos. Grieve	.62	226	Sept. 13	M. E. Bunger	1.32	464
Mar. 24	do	.79	265	Oct. 12	do	1.70	657
Apr. 20	do	.80	289	Dec. 16	do	.55	233
May 12	do	2.55	1,020				

Daily gage height, in feet, of Arkansas River at Salida, Colo., for 1911.

[Howard Sneddon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.4	0.6	0.5	0.65	1.6	3.4	3.55	2.6	1.85	1.5	1.15	0.8
2	.35	.55	.5	.7	1.5	3.6	4.65	2.65	1.85	1.65	1.15	.85
3	.35	.55	.55	.7	1.35	3.65	4.8	2.45	1.75	1.6	1.25	.75
4	.35	1.25	.55	.75	1.85	3.6	4.8	2.55	1.7	1.6	1.3	.8
5	.3	1.3	.6	.7	1.9	3.85	4.9	2.35	1.6	2.05	1.2	.8
6	.4	.7	.6	.65	2.2	4.15	4.6	2.25	1.5	2.35	1.0	.9
7	.45	.7	.55	.6	2.5	4.15	3.75	2.25	1.3	1.9	1.05	.85
8	.55	.7	.55	.6	2.6	4.2	3.6	1.95	1.25	1.85	1.15	.75
9	.55	.7	.6	.6	2.8	4.45	3.8	1.75	1.25	1.85	1.15	.7
10	.6	.65	.8	.65	2.9	4.2	3.8	1.75	1.25	1.85	1.2	.75
11	.6	.6	.75	.6	2.8	4.15	3.7	1.9	1.3	1.8	1.2	.65
12	.5	.6	.6	.6	2.5	4.25	3.8	1.85	1.3	1.7	.9	.55
13	.5	.6	.6	.55	2.4	4.25	3.75	1.9	1.45	1.6	1.0	.6
14	.5	.6	.55	.5	2.35	4.2	3.7	1.85	1.45	1.6	1.1	.55
15	.5	.6	.6	.5	2.5	4.5	3.5	1.85	1.55	1.7	1.05	.5
16	.55	.6	.6	.55	2.35	4.5	3.3	1.75	1.55	1.6	1.05	.6
17	.55	.6	.7	.65	2.45	4.3	3.2	1.75	1.5	1.65	1.0	.55
18	.5	.6	.6	.65	2.5	4.3	3.2	1.75	1.4	1.55	1.0	.5
19	.5	.55	.6	.75	2.55	4.2	3.45	2.1	1.25	1.5	1.15	.6
20	.5	.5	.6	.85	2.4	4.3	3.35	2.35	1.3	1.5	1.1	.6
21	.55	.5	.65	.85	2.2	4.4	2.8	2.5	1.3	1.5	1.1	.5
22	.5	.45	.7	.9	2.15	4.6	3.15	2.6	1.2	1.5	1.0	.45
23	.45	.4	.65	.95	2.2	4.4	3.1	2.35	1.2	1.5	.9	.6
24	.5	.45	.65	1.0	2.35	4.2	3.05	2.55	1.3	1.5	.95	.6
25	.5	.55	.7	1.0	2.6	4.15	2.95	2.65	1.3	1.5	.9	.55
26	.5	.5	.6	.95	2.8	3.9	3.05	2.2	1.25	1.5	1.15	.5
27	.55	.5	.55	1.1	2.8	3.8	2.85	2.3	1.2	1.5	1.0	.5
28	.6	.5	.6	1.25	2.95	3.95	2.85	1.9	1.2	1.5	.8	.6
29	.6	....	.55	1.4	3.1	3.85	2.75	1.95	1.1	1.2	.75	.6
30	.6	....	.6	1.5	3.2	3.6	2.7	2.05	1.3	1.15	.85	.6
31	.6	....	.6	....	3.2	....	2.45	1.9	....	1.25	....	.55

NOTE.—Gage heights Oct. 22 to 27, 1911, estimated.

Daily discharge, in second-feet, of Arkansas River at Salida, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	175	215	195	228	540	1,680	1,815	1,110	758	555	395	280
2	168	205	195	240	500	1,860	2,860	1,175	758	635	395	295
3	168	205	205	240	440	1,905	3,010	1,040	695	605	435	265
4	168	402	205	252	655	1,860	3,010	1,130	665	605	455	280
5	160	420	215	240	680	2,085	3,110	1,000	605	888	415	280
6	175	240	215	228	830	2,760	2,810	960	555	1,110	340	310
7	185	240	205	215	1,000	2,360	1,995	970	455	790	358	295
8	205	240	205	215	1,070	2,410	1,860	790	435	758	395	265
9	205	240	215	215	1,210	2,660	2,040	680	435	758	395	250
10	215	228	265	228	1,280	2,410	2,040	690	435	758	415	265
11	215	215	252	215	1,210	2,360	1,950	790	455	725	415	238
12	195	215	215	215	1,000	2,460	2,040	758	455	665	310	215
13	195	215	215	205	940	2,460	1,995	790	530	605	340	225
14	195	215	205	195	912	2,410	1,950	758	530	605	375	215
15	195	215	215	195	1,000	2,710	1,770	758	580	665	358	205
16	205	215	215	205	912	2,710	1,600	695	580	605	358	225
17	205	215	240	228	970	2,510	1,520	695	555	635	340	215
18	195	215	215	228	1,000	2,510	1,520	695	505	580	340	205
19	195	205	215	252	1,035	2,410	1,725	920	435	555	395	225
20	195	195	215	278	940	2,510	1,640	1,110	455	555	375	225
21	205	195	228	278	830	2,610	1,210	1,230	455	555	375	205
22	195	185	240	290	805	2,810	1,480	1,315	415	555	340	195
23	185	175	228	305	830	2,610	1,440	1,110	415	555	310	225
24	195	185	228	320	912	2,410	1,400	1,272	455	555	325	225
25	195	205	240	320	1,070	2,360	1,320	1,358	455	555	310	215
26	195	195	215	305	1,210	2,130	1,400	995	435	555	395	205
27	205	195	205	350	1,210	2,040	1,245	1,070	415	555	340	205
28	215	195	215	402	1,320	2,175	1,245	790	415	555	280	225
29	215	....	205	460	1,440	2,085	1,175	822	375	415	265	225
30	215	....	215	500	1,520	1,860	1,140	888	455	395	295	225
31	215	....	215	....	1,520	....	980	790	....	435	....	215

NOTE.—Daily discharge determined from well-defined rating curves applicable as follows: Jan. 1 to July 29 and Aug. 12 to Dec. 31. Discharge July 30 to Aug. 11 determined by indirect method for shifting channels.

Monthly discharge of Arkansas River at Salida, Colo., for 1911.

[Drainage area, 1,160 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	215	160	195	0.168	0.19	12,000
February	420	175	224	.193	.20	12,500
March	265	195	218	.188	.22	13,400
April	500	195	268	.231	.26	16,000
May	1,520	440	993	.856	.99	61,100
June	2,810	1,680	2,320	2.00	2.23	138,000
July	3,010	980	1,820	1.57	1.81	112,000
August	1,360	680	940	.810	.93	57,800
September	758	375	506	.436	.49	30,100
October	1,110	395	624	.538	.62	38,400
November	455	265	361	.311	.35	21,500
December	295	195	237	.204	.24	14,600
The year	3,010	160	728	.628	8.53	527,000

NOTE.—No accuracy notes given, as the entire record was furnished by the State engineer of Colorado.

ARKANSAS RIVER AT CANON CITY, COLO.

Location.—Just below the suspension bridge at Hot Springs Hotel, at the mouth of the canyon, and 1½ miles above Canon City. The nearest important tributary is Grape Creek, which enters above.

Records available.—May 1, 1888, to December 31, 1911.

Drainage area.—3,060 square miles.

Gage.—Automatic recording gage established by the State engineer in September, 1909. The original Geological Survey gage was established April 17, 1889. On October 4, 1895, a new staff gage was established on the left bank opposite the original gage and referred to the same datum. At low stages it read 0.4 foot lower than the original gage, but at high stages the readings were the same. On August 26, 1902, a gage was established on the right bank near the first gage, and referred to the same datum. The datum of the recording gage now used is 2.00 feet higher than that of the last gage.

Channel.—The channel shifts to such an extent during high water that at times it is necessary to move the gage in order to obtain the gage heights.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 131 second-feet from the Arkansas between the stations at Canon City and Salida, and diversions of 2,286 second-feet from intervening tributaries.

Cooperation.—During 1911 this station was maintained and records were furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River at Canon City, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 17	G. H. Russell	3.55	322	June 23	C. C. Hezmalhalch	6.65	2,930
29	Grieve and Clayton	3.44	277	July 23	Thos. Grieve	5.55	1,760
29	.....do	3.44	289	Aug. 13	Hezmalhalch and Bunger	4.42	676
Feb. 20	G. H. Russell	3.50	268	Sept. 13	M.E. Bunger	3.98	414
Mar. 23	Thos. Grieve	3.88	423	Oct. 13	.....do	6.96	1,210
Apr. 20	.....do	3.38	269	Nov. 21	B. S. Clayton	6.60	464
May 12	.....do	4.87	1,110	Dec. 17	M. E. Bunger	6.20	330

Daily gage height, in feet, of Arkansas River at Canon City, Colo., for 1911.

[S. R. McKissick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	3.5	3.55	3.55	4.05	5.65	5.9	5.05	4.45	4.2	6.8	6.5
2	3.35	3.4	3.65	3.55	4.0	5.85	6.25	5.2	4.4	4.35	6.8	6.5
3	3.3	3.4	3.65	3.5	3.85	5.9	6.9	4.95	4.4	4.3	6.75	6.5
4	3.4	3.55	3.65	3.6	3.95	5.95	7.1	5.0	4.4	4.2	6.7	6.5
5	3.55	4.0	3.75	3.5	4.25	6.05	7.05	4.85	4.3	4.45	6.7	6.5
6	3.55	3.9	3.75	3.5	4.35	6.3	7.15	4.75	4.2	7.2	6.75	6.5
7	3.65	3.55	3.7	3.45	4.6	6.35	6.35	4.6	4.1	7.55	6.7	6.5
8	3.7	3.5	3.7	3.4	4.85	6.4	6.1	4.55	4.0	7.7	6.7	6.5
9	3.7	3.5	3.85	3.4	5.05	6.55	6.15	4.2	4.0	7.4	6.7	6.45
10	3.7	3.55	4.1	3.35	5.15	6.55	6.15	4.2	3.95	7.25	6.7	6.4
11	3.75	3.5	4.15	3.4	5.1	6.3	6.1	4.75	3.9	7.1	6.7	6.4
12	3.65	3.5	3.95	3.3	4.9	6.45	6.05	4.55	3.9	7.0	6.7	6.4
13	3.6	3.5	3.85	3.3	4.7	6.4	6.1	4.45	3.95	6.95	6.7	6.4
14	3.5	3.45	3.75	3.3	4.7	6.55	6.2	4.5	4.0	6.9	6.7	6.4
15	3.45	3.45	3.75	3.25	4.75	6.55	5.85	4.4	4.15	6.9	6.7	6.4
16	3.55	3.5	3.75	3.25	4.8	6.9	6.0	4.25	4.1	6.85	6.6	6.4
17	3.6	3.55	3.75	3.25	4.8	6.6	5.7	4.3	4.1	6.85	6.6	6.4
18	3.55	3.55	3.75	3.4	4.95	6.55	5.85	4.35	4.05	6.8	6.6	6.4
19	3.5	3.6	3.7	3.35	5.05	6.55	5.9	4.3	4.0	6.85	6.6	6.4
20	3.5	3.55	3.75	3.4	5.05	6.55	6.0	4.3	3.95	6.85	6.6	6.4
21	3.6	3.5	3.85	3.4	4.8	6.65	5.85	4.9	4.0	6.8	6.6	6.4
22	3.55	3.45	3.85	3.4	4.65	6.8	5.75	5.35	4.0	6.8	6.55	6.4
23	3.5	3.4	3.85	3.45	4.6	6.6	6.7	5.45	4.0	6.8	6.5	6.4
24	3.55	3.5	3.85	3.55	4.65	6.55	5.75	5.15	3.9	6.8	6.5	6.4
25	3.5	3.6	3.9	3.6	4.8	6.55	5.6	5.25	3.9	6.8	6.6	6.3
26	3.55	3.6	3.8	3.5	5.05	5.2	5.6	5.05	3.85	6.8	6.6	6.3
27	3.5	3.5	3.6	3.5	5.15	6.0	5.5	4.9	3.8	6.8	6.6	6.3
28	3.5	3.5	3.65	3.65	5.2	6.05	5.4	4.75	3.8	6.8	6.55	6.3
29	3.5	....	3.65	3.75	5.35	6.05	5.3	4.65	3.8	6.8	6.5	6.3
30	3.5	....	3.6	3.95	5.4	5.95	5.25	4.65	4.8	6.8	6.5	6.3
31	3.5	....	3.65	....	5.45	....	5.05	4.6	....	6.75	....	6.3

Daily discharge, in second-feet, of Arkansas River at Canon City, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	290	290	305	305	495	1,830	2,090	1,210	680	520	790	410
2	260	270	335	305	470	2,040	2,460	1,360	645	612	790	410
3	250	270	335	290	410	2,090	3,190	1,120	645	580	690	410
4	270	305	335	320	450	2,150	3,420	1,360	645	520	600	410
5	305	470	370	290	610	2,250	3,360	1,020	580	680	600	410
6	305	430	370	290	675	2,520	3,490	930	520	3,450	690	410
7	335	305	350	280	860	2,570	2,570	800	470	3,870	600	410
8	350	290	350	270	1,060	2,620	2,300	755	420	3,290	600	410
9	350	290	410	270	1,240	2,790	2,360	520	420	2,400	600	390
10	350	305	520	260	1,340	2,790	2,360	520	395	1,980	600	370
11	370	290	550	270	1,290	2,520	2,305	930	370	1,570	600	370
12	335	290	450	250	1,110	2,680	2,250	755	370	1,320	600	370
13	320	290	410	250	940	2,620	2,300	675	395	1,200	600	370
14	290	280	370	250	940	2,790	2,410	715	420	1,030	600	370
15	280	280	370	242	980	2,790	2,040	645	495	1,030	600	370
16	305	290	370	242	1,020	3,190	2,200	550	470	900	465	370
17	320	305	370	242	1,020	2,840	1,880	580	470	900	465	370
18	305	305	370	270	1,160	2,790	2,040	612	445	790	465	370
19	290	320	350	260	1,240	2,790	2,090	580	420	900	465	370
20	290	305	370	270	1,240	2,790	2,200	580	395	900	465	370
21	320	290	410	270	1,020	2,900	2,040	1,040	420	790	465	370
22	305	280	410	270	900	3,080	1,940	1,440	420	790	430	370
23	280	270	410	280	860	2,840	1,880	1,540	420	790	410	370
24	305	290	410	305	900	2,790	1,940	1,260	370	790	410	370
25	290	320	430	320	1,020	2,570	1,780	1,350	370	790	465	340
26	305	320	390	290	1,240	2,410	1,780	1,170	350	790	465	340
27	290	290	320	290	1,340	2,200	1,680	1,035	330	790	465	340
28	290	290	335	335	1,380	2,250	1,570	910	330	790	430	340
29	290	....	335	370	1,530	2,250	1,460	830	330	790	410	340
30	290	....	320	450	1,580	2,150	1,410	830	420	790	410	340
31	290	....	335	....	1,630	....	1,210	790	....	690	....	340

NOTE.—Daily discharge determined from well-defined rating curves applicable as follows: Jan. 1 to July 23 and Aug. 14 to Oct. 7. Discharge July 24 to Aug. 13 determined by indirect method for shifting channels. Determinations Oct. 8 to Dec. 31 somewhat uncertain on account of the change in cross section during the flood in October.

Monthly discharge of Arkansas River at Canon City, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	370	250	304	18,700
February	470	270	305	16,900
March	550	305	380	23,300
April	450	242	287	17,080
May	1,680	410	1,030	63,300
June	3,190	1,830	2,560	152,000
July	3,490	1,210	2,190	135,000
August	1,540	520	917	56,400
September	680	330	448	26,600
October	3,870	520	1,200	73,800
November	790	410	542	32,200
December	410	340	374	23,000
The year	3,870	250	882	638,000

NOTE.—Accuracy notes are not given as the entire record was furnished by the State engineer of Colorado.

ARKANSAS RIVER AT PUEBLO COLO

Location.—At Main Street Bridge in Pueblo, 2 miles above the mouth of Fountain Creek, the nearest tributary.

Records available.—September 19, 1894, to December 31, 1911. From May 1, 1885, to September 30, 1886, a station was maintained at Pueblo by the State engineer. From June 1, 1887, to September 30, 1887, a station was maintained at a point 9 miles above Pueblo; from May 1, 1889, to August 31, 1889, the Geological Survey maintained the station 9 miles above Pueblo.

Drainage area.—4,600 square miles.

Gage.—An automatic gage located 150 feet below Main Street Bridge has been used since March 22, 1911. It is referred to the same datum as the chain gage on Main Street Bridge, which was installed July 7, 1905, but the slope of the river causes a difference in readings. A vertical staff placed at the Santa Fe Avenue Bridge on September 19, 1894, was used until July 10, 1898, when a second gage was placed at Main Street Bridge and used until March 3, 1900. From that date until July 14, 1902, a vertical staff near the Union Avenue Bridge was used. From that date until July 7, 1905, a staff gage referred to a different datum was used.

Channel.—The channel shifts to such an extent during high water that it has been necessary to move the gage in order to read the gage heights.

Discharge measurements.—Made from Main Street Bridge.

Winter flow.—Ice causes some slight backwater during the winter months.

Diversions.—There are court decrees for diversions of 637 second-feet from Arkansas River between the station at Canon City and Pueblo and diversions of 372 second-feet from intervening tributaries.

Cooperation.—From 1894 to 1908 this station was maintained by the United States Geological Survey. At present the station is maintained and records are furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River at Pueblo, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 17	G. H. Russell	1.99	270	June 17	A. A. Weiland	4.83	2,750
30	Grieve and Clayton	1.90	194	22	C. C. Hezmalhalch	4.79	2,690
Feb. 19	G. H. Russell	2.03	283	July 1	A. A. Weiland	3.80	1,600
Mar. 21	C. L. Chatfield	2.11	278	5	.....do	5.19	3,080
Apr. 13	.....do	1.75	109	22	Thos. Grieve	3.88	1,650
15	A. A. Weiland	1.69	95.3	Aug. 14	Hezmalhalch and Bunger	2.82	661
17	C. L. Chatfield	1.70	105	Sept. 14	M. E. Bunger	2.46	353
May 30	A. A. Weiland	3.25	1,220	Oct. 13	.....do	3.19	[illegible]

Daily gage height, in feet, of Arkansas River at Pueblo, Colo., for 1911.

[David J. Cox, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.15	1.95	2.05	2.0	2.4	3.65	3.85	3.45	3.05	2.65	2.9	2.7
2	2.5	1.9	2.1	2.05	2.4	3.85	4.1	3.6	3.0	2.95	2.95	2.7
3	2.05	1.95	2.15	2.1	2.4	3.85	4.7	3.5	2.85	2.9	2.95	2.7
4	2.6	1.8	2.05	2.05	2.25	3.85	5.15	3.35	2.95	2.75	2.95	2.6
5	2.75	2.1	2.1	2.05	2.5	4.0	5.2	3.4	2.9	2.85	2.95	2.55
6	2.55	2.25	2.05	2.0	2.7	4.05	5.25	3.2	2.75	4.15	2.95	2.55
7	2.65	2.15	2.1	1.95	2.7	4.3	5.2	3.05	2.65	5.10	2.9	2.5
8	2.6	1.85	2.05	1.75	3.1	4.4	4.45	3.05	2.5	4.05	2.85	2.5
9	2.75	1.9	2.1	1.8	3.25	4.45	4.35	2.8	2.55	3.6	2.85	2.5
10	2.7	1.95	2.2	1.7	3.3	4.75	4.25	2.6	2.45	3.45	2.9	2.5
11	2.6	1.95	2.5	1.8	3.5	4.4	4.25	2.65	2.4	3.3	2.95	2.5
12	2.25	1.95	2.4	1.75	3.35	4.4	4.15	3.2	2.45	3.25	2.85	2.65
13	2.05	1.95	2.15	1.8	3.0	4.4	4.15	2.95	2.4	3.35	2.8	2.65
14	2.05	2.00	2.05	1.7	3.1	4.45	4.25	2.95	2.5	3.05	2.7	2.7
15	2.1	1.9	2.05	1.7	3.0	4.5	4.2	2.9	2.65	3.05	2.8	2.65
16	2.05	1.95	2.10	1.65	3.1	5.2	4.6	2.9	2.7	3.2	2.8	2.65
17	2.05	2.0	2.05	1.7	3.05	4.9	4.05	2.75	2.7	3.15	2.8	2.65
18	1.9	2.05	2.1	1.6	3.05	4.75	3.95	2.85	2.7	3.25	2.8	2.65
19	1.95	2.0	2.05	1.8	3.2	4.6	4.5	2.7	2.45	3.2	2.9	2.65
20	1.9	2.05	2.1	1.8	3.4	4.55	4.2	3.15	2.5	3.25	2.9	2.7
21	1.95	2.1	2.05	1.8	3.15	4.7	4.35	3.25	2.5	3.2	2.75	2.65
22	1.9	2.1	2.2	1.9	3.05	4.8	4.3	3.7	2.55	3.2	2.7	2.6
23	2.05	2.0	2.15	1.95	2.95	4.8	4.1	3.95	2.55	3.2	2.65	2.6
24	2.0	2.05	2.2	2.15	3.0	4.6	4.05	3.55	2.55	3.2	2.65	2.7
25	2.0	2.05	2.05	2.15	3.05	4.85	3.9	3.75	2.45	3.25	2.6	2.8
26	1.95	2.2	2.1	2.1	3.2	4.25	3.9	3.75	2.45	3.2	2.6	2.75
27	1.95	2.1	2.1	2.0	3.35	4.1	3.8	3.4	2.45	3.25	2.7	2.6
28	1.95	2.2	2.05	2.0	3.95	3.95	3.75	3.35	2.4	3.15	2.7	2.6
29	1.9	......	2.0	2.2	3.5	4.0	3.3	3.15	2.45	3.1	2.7	2.65
30	1.95	......	1.95	2.25	3.7	3.95	3.55	3.15	2.35	2.95	2.7	2.65
31	1.9	......	1.90	......	3.6	......	3.45	3.2	......	2.9	......	......

NOTE.—Gage heights somewhat affected by ice Jan. 1 to 12 and Dec. 12 to 31, 1911.

Daily discharge, in second-feet, of Arkansas River at Pueblo, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	265	235	295	265	535	1,550	1,630	1,200	822	500	700	540
2	250	205	325	295	535	1,750	1,890	1,350	780	740	740	540
3	250	235	358	325	535	1,750	2,540	1,240	660	700	740	540
4	250	150	295	295	425	1,740	3,030	1,100	740	580	740	460
5	250	325	325	295	610	1,880	3,080	1,140	700	660	740	425
6	275	425	295	265	770	1,930	3,140	955	580	1,950	740	425
7	275	358	325	235	770	2,190	3,080	822	500	2,980	700	390
8	275	178	295	125	1,130	2,290	2,280	822	390	1,840	660	390
9	290	205	325	150	1,280	2,340	2,170	620	425	1,350	660	390
10	290	235	390	100	1,320	2,670	2,060	460	355	1,200	700	390
11	290	235	610	150	1,520	2,260	2,060	500	320	1,050	740	390
12	290	235	535	125	1,380	2,250	1,950	955	355	1,000	660	400
13	295	235	358	150	1,040	2,240	1,950	740	320	1,100	620	400
14	295	265	295	100	1,130	2,280	2,060	740	390	822	540	400
15	325	205	295	100	1,040	2,320	2,000	700	500	822	620	400
16	295	235	325	82	1,130	3,120	2,440	700	540	955	620	400
17	295	265	295	100	1,080	2,760	1,840	580	540	910	620	400
18	205	295	325	65	1,080	2,600	1,740	660	540	1,000	620	400
19	235	265	295	150	1,220	2,440	2,330	540	355	955	700	400
20	205	295	325	150	1,420	2,380	2,000	910	390	1,000	700	400
21	235	325	295	150	1,160	2,540	2,170	1,000	390	955	580	350
22	205	325	390	205	1,060	2,660	2,120	1,460	425	955	540	350
23	295	265	358	235	960	2,660	1,890	1,740	425	955	500	350
24	265	295	390	358	1,000	2,440	1,840	1,300	425	955	500	350
25	265	295	295	358	1,040	2,170	1,680	1,520	355	1,000	460	350
26	235	390	325	325	1,170	2,060	1,680	1,520	355	955	460	350
27	235	325	325	265	1,310	1,890	1,570	1,140	355	1,000	540	350
28	235	390	295	265	1,910	1,740	1,520	1,100	320	910	540	350
29	205	......	265	390	1,460	1,790	1,570	910	355	865	540	350
30	235	......	235	425	1,620	1,740	1,300	910	290	740	540	350
31	205	......	205	......	1,510	......	1,200	955	......	700	......	350

NOTE.—Daily discharge determined as follows: Jan. 1 to 12 estimated on account of ice; Jan. 13 to May 30, from a well-defined curve; May 21 to June 17, by the indirect method for shifting channels; June 18 to Dec. 11, from a well-defined curve. Discharge Dec. 12 to 31 estimated on account of ice.

Monthly discharge of Arkansas River at Pueblo, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	325	205	259	15,900
February	425	150	275	15,300
March	610	205	331	20,400
April	425	65	217	12,900
May	1,910	425	1,100	67,800
June	3,120	1,550	2,210	132,000
July	3,140	1,200	2,060	127,000
August	1,740	460	977	60,100
September	822	290	463	27,600
October	2,980	500	1,040	63,700
November	740	460	625	37,200
December	540	350	398	24,500
The year	3,140	65	834	604,000

NOTE.—Accuracy notes not given, as the entire record was furnished by the State engineer of Colorado.

ARKANSAS RIVER NEAR NEPESTA, COLO.

Location.—At the dam of the Oxford Farmers' Canal Co. in sec. 31, T. 21 S., R. 60 W., 1½ miles above Nepesta; about 6 miles below the mouth of Huerfano River, the nearest important tributary.

Records available.—September 8, 1897, to October 31, 1903; July 14, 1909, to December 15, 1911.

Drainage area.—9,130 square miles.

Gage.—An automatic recording gage with its zero coinciding with the lowest point of the diversion dam has been in use since 1910. There is no known relation between the present gage and that used in 1903.

Channel.—The diversion dam is the control point, and as the results show shifting conditions it is evident the dam is not permanent.

Discharge measurements.—Made from the bridge at Nepesta except during low water, when measurements are made by wading. Between the gage and the measuring section is a wasteway from the canal. The flow at this point is subtracted from the flow at the bridge in order to show the amount of water below the canal.

Winter flow.—Ice causes backwater during a portion of the winter months.

Diversions.—There are court decrees for diversions of 1,552 second-feet from the Arkansas between Pueblo and Nepesta, and approximately 1,600 second-feet from intervening tributaries. The records do not include the flow of the canal.

Cooperation.—Since 1909 this station has been maintained and records have been furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River near Nepesta, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 1	Thos. Grieve	0.70	237	May 27	A. A. Welland	1.42	1,146
Mar. 21	C. L. Chatfield	.82	229	June 8	.....do	1.6	1,633
Apr. 13	.....do	.33	67	16	.....do	1.9	2,016
May 12	A. A. Welland	1.22	1,158	30	.....do	1.58	1,600
19	Thos. Grieve	1.25	1,034				

Daily gage height, in feet, of Arkansas River near Nepesta, Colo., for 1911.

[C. W. Cummings, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	....	0.85	1.4	1.5	1.1	1.0	0.7	1.0	0.95
2	....	....	.9	1.45	1.75	1.1	.95	.8	1.05	.8
3	....	0.6	.85	1.55	1.9	.9	.95	.95	1.1	.75
4	....	.7	.8	1.4	2.05	1.0	1.05	.9	.5	.65
5	....	.7	.75	1.65	1.9	.8	1.0	.95	.85	.65
6	....	.7	.85	1.65	1.9	.8	.95	2.1	1.2	.6
7	....	.7	.8	1.6	2.25	.85	.9	1.7	1.1	.55
8	....	.7	1.15	1.75	1.75	.7	.9	1.3	1.1	.8
9	....	....	1.2	1.8	1.5	.5	.85	1.6	1.25	.75
10	....	.4	1.3	1.6	1.6	.9	.85	1.5	1.0	....
11	....	.55	1.25	1.6	1.65	.9	.8	1.3	.95	.7
12	....	.4	1.2	1.45	1.65	.95	.8	1.1	1.1	.8
13	....	.45	1.15	1.7	1.75	.9	.8	1.0	1.25	.75
14	....	.4	1.0	1.7	1.85	.95	.8	1.0	1.0	.75
15	....	.4	.95	1.75	1.85	.85	.7	.9	.5	.7
16	....	.35	.95	1.8	1.65	.8	.8	1.1	.4	....
17	....	.4	1.0	1.8	1.6	.7	.8	1.1	.3	....
18	....	.5	1.05	1.45	1.5	.7	.8	1.15	1.1	....
19	....	.5	1.15	1.6	1.55	.8	.85	1.2	1.1	....
20	....	.5	1.25	1.7	1.4	.75	.75	1.1	1.0	....
21	0.8	.5	1.35	1.8	1.6	.75	.75	1.4	1.0	....
22	.8	.45	1.2	1.6	2.2	1.0	.75	1.0	.85	....
23	.8	.55	1.2	1.6	1.3	1.15	.85	1.1	1.1	....
24	.85	.6	1.15	1.55	1.25	1.2	.85	1.0	.9	....
25	.7	.75	1.1	1.55	1.4	1.2	.85	1.1	.85	....
26	.7	.7	1.25	1.55	1.45	1.1	.85	1.0	1.0	....
27	....	.65	1.4	1.6	1.25	1.1	.85	.8	.8	....
28	....	.7	1.5	1.7	1.5	1.1	.75	.8	.8	....
29	....	.75	1.35	1.8	1.6	1.25	.7	.85	.85	....
30	....	.8	1.4	1.55	1.4	1.2	.7	.9	.95	....
31	....	....	1.4	....	1.3	1.1	....	1.25	....	....

ARKANSAS RIVER AT NEW FORT LYONS, COLO.

Location.—At the United States Naval Hospital at New Fort Lyons, 6 miles east of Las Animas, 2 miles below mouth of Purgatory River, the nearest tributary.

Records available.—April 5 to December 25, 1911.

Gage.—Automatic recording gage.

Channel.—Shifting.

Discharge measurements.—Made from a car and cable, except during low water, when they are made by wading.

Winter flow.—Ice causes some backwater during the winter months.

Diversions.—There are court decrees for diversions of 2,760 second-feet from the Arkansas between Nepesta and New Fort Lyons, and about 1,000 second-feet from intervening tributaries.

Cooperation.—This station is maintained and records are furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River at New Fort Lyons, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 23	C. L. Chatfield	1.15	55	July 15	H. C. Ogden	2.8	1,192
Apr. 4	.....do	1.35	86	Sept. 12	C. L. Patterson	1.6	50
15	.....do	.98	33	19	.....do	1.55	32
May 13	H. C. Ogden	1.98	383	27	.....do	1.6	34
18	Thos. Grieve	1.28	48	Oct. 8	.....do	2.05	518
July 10	A. A. Weiland	1.89	328				

Daily gage height, in feet, of Arkansas River at New Fort Lyons, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		1.1	2.1	2.05	2.2	1.8	1.6	2.1	3.0
2		1.1	1.95	2.1	2.05	1.85	1.6	2.15	3.0
3		1.05	1.65	2.2	1.95	1.85	1.6	2.15	3.0
4		1.2	1.85	2.3	2.1	1.5	1.55	1.95	2.7
5	1.3	1.1	2.25	2.0	1.95	1.5	1.65	1.7	2.0
6	1.15	1.1	2.25	2.4	1.55	1.6	1.8	1.7	1.8
7	1.1	1.0	2.25	2.9	1.4	1.5	2.4	2.1	2.1
8	1.15	1.0	2.0	2.6	1.4	1.55	2.2	2.1	2.1
9	1.25	1.15	1.8	2.15	1.3	1.65	2.4	1.7	2.2
10	.95	1.35	1.85	1.95	1.2	1.6	2.4	1.55	1.7
11	.8	1.9	1.9	2.1	1.2	1.65	2.5	1.6	1.7
12		2.05	2.25	2.05	1.05	1.6	2.75	1.65	1.6
13		2.0	1.75	2.55	1.1	1.55	2.5	1.7	1.95
14		1.8	1.8	3.0	1.05	1.55	2.4	2.0	2.05
15	1.0	1.6	2.0	2.95	1.4	1.6	2.4	2.2	1.95
16	1.05	1.4	2.1	2.35	1.25	1.6	2.3	2.0	1.9
17	1.05	1.3	2.1	3.25	1.1	1.6	2.2	1.8	1.95
18	1.05	1.1	1.85	2.4	1.1	1.6	2.2	1.4	2.0
19	1.05	1.3	1.55	1.95	1.05	1.6	2.3	1.8	2.0
20	1.0	1.7	1.9	3.6	1.05	1.65	2.35	1.75	1.9
21	1.05	2.0	2.25	3.7	1.0	1.75	2.4	1.85	1.9
22	1.05	2.25	2.05	3.85	1.0	1.7	2.2	2.05	2.1
23	1.0	2.1	1.9	3.65	1.1	1.6	2.3	2.05	1.9
24	1.05	2.0	1.85	2.85	1.4	1.6	2.2	2.2	2.3
25	1.05	1.95	1.65	2.0	1.55	1.6	2.25	2.1	2.3
26	1.1	1.85	1.65	2.15	1.8	1.6	2.15	2.1	
27	1.15	1.7	1.95	2.05	2.0	1.6	2.0	1.9	
28	1.15	2.2	2.15	2.05	2.0	1.6	1.9	2.15	
29	1.05	3.75	2.25	2.2	1.8	1.6	1.75	2.9	
30	1.05	2.5	2.4	2.1	2.2	1.6	1.9	3.3	
31		2.1		2.1	1.85		2.05		

NOTE.—Gage heights somewhat affected by ice during the last part of November and throughout December.

Daily discharge, in second-feet, of Arkansas River at New Fort Lyons, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		50	480	440	510	145	100	560	1,530
2		50	365	480	390	165	110	600	1,530
3		45	192	560	315	165	130	600	1,530
4		60	300	650	410	60	120	440	1,170
5	75	50	605	400	300	60	175	390	460
6	55	50	605	750	115	70	270	390	340
7	50	40	605	1,310	70	50	810	560	560
8	55	40	400	970	70	55	655	560	560
9	68	55	270	520	55	60	840	390	650
10	35	88	300	365	40	50	840	220	280
11	25	330	330	480	40	45	950	240	290
12		440	605	440	25	45	1,230	265	240
13		400	242	915	30	30	950	290	440
14		270	270	1,430	25	30	840	460	520
15	40	160	400	1,370	70	45	840	650	440
16	45	90	480	700	45	45	700	460	410
17	45	65	480	1,745	30	45	650	340	440
18	45	40	300	750	30	45	650	170	460
19	45	55	150	365	25	45	760	340	460
20	40	205	330	2,200	25	45	790	320	410
21	45	400	605	2,330	20	100	840	320	410
22	45	610	440	2,530	20	80	650	520	560
23	40	480	330	2,265	30	45	740	520	410
24	45	400	300	690	60	45	650	650	740
25	45	365	192	390	85	45	700	560	740
26	50	300	192	505	170	45	600	560	
27	55	215	365	415	260	45	460	410	
28	55	560	520	410	260	50	400	600	
29	45	2,395	605	530	150	70	310	1,400	
30	45	860	750	440	360	30	400	1,900	
31		480		440	175		520		

Monthly discharge of Arkansas River at New Fort Lyons, Colo., for 1901.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April 15-30	55	40	45.6	1,450
May	2,400	40	311	19,100
June	750	150	400	23,800
July	2,530	365	896	55,100
August	510	20	136	8,350
September	165	30	64	3,780
October	1,230	100	606	37,200
November	650	170	436	26,000
December 1-25	650	240	426	21,100
The period				197,000

NOTE.—Accuracy notes not given, as the entire record was furnished by the State engineer of Colorado.

ARKANSAS RIVER AT HOLLY, COLO.

Location.—At highway bridge half a mile southeast of Holly, on line between secs. 14 and 15, T. 23 S., R. 42 W., 1 mile below the mouth of Wild Horse Creek, an intermittent stream.

Records available.—October 15, 1907, to December 31, 1911.

Drainage area.—Approximately 25,000 square miles.

Gage.—A number of gages have been used at the station, but the readings have all been referred to the same datum, except readings subsequent to October 25, 1911, when a different datum was used.

Channel.—Very shifting.

Discharge measurements.—Made from bridge during high water and by wading at low stages.

Winter flow.—Ice causes backwater during a portion of the winter months.

Diversions.—There are court decrees for diversions of 1,047 second-feet from Arkansas River between the stations at New Fort Lyons and Holly, and diversions of 753 second-feet from intervening tributaries. There are many diversions from Arkansas River below Holly, in Kansas.

Accuracy.—Owing to the shifting character of the channels, the estimates can not be considered better than fair.

Cooperation.—Station maintained and records furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River at Holly, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 2	Thos. Grieve	1.20	58	Sept. 15	C. L. Patterson		4.1
28[a]	do		64	Oct. 3	do		2.27
Mar. 24	C. L. Chatfield	1.35	43	18	Thos. Grieve	1.50	21
Apr. 3	do	1.30	36	Dec. 2	W. F. Hicks	[c]1.50	1,000
15	do	1.20	6.1	4	do	[c]1.00	351
May 17	Thos. Grieve		[b]5.0	6	do	[c]1.18	521
July 16	do	2.60	645	8	do	[c].95	298
20	H. C. Ogden	2.10	179	9	do	[c].93	282
21	do	3.95	3,770	11	do	[c].95	290
Aug. 25	Thos. Grieve	1.30	[b]5.0				

[a] Ice in stream. [b] Estimated. [c] From a gage referred to a new datum.

Daily gage height, in feet, of Arkansas River at Holly, Colo., for 1911.

[S. W. Jones, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.2	1.2	1.4	1.5	1.2	1.9	1.4	1.75	1.3	1.3	0.65	0.95
2	1.2	1.2	1.6	1.4	1.2	1.9	1.5	1.7	1.3	1.3	.85	1.15
3	1.2	1.2	1.7	1.35	1.2	1.9	1.5	1.6	1.3	1.3	1.2	1.15
4	1.2	1.2	1.7	1.3	1.2	1.9	1.6	1.7	1.3	1.3	1.15	1.05
5	1.2	1.2	1.4	1.3	1.2	1.6	1.6	2.3	1.3	1.3	1.35	1.0
6	1.2	1.2	1.5	1.3	1.2	1.6	1.6	2.15	1.3	1.3	1.25	1.1
7	1.2	1.2	1.5	1.3	1.2	1.6	2.4	2.15	1.3	1.3	1.2	1.0
8	1.1	1.2	1.5	1.3	1.15	1.6	2.2	1.95	1.3	1.3	1.2	......
9	1.1	1.2	1.5	1.3	1.05	1.6	2.1	1.8	1.3	1.3	1.4	.95
10	1.15	1.2	1.5	1.35	1.0	1.6	2.15	1.75	1.3	1.3	1.4	1.1
11	1.1	1.2	1.5	1.25	1.0	1.6	2.1	1.5	1.3	1.3	1.65	1.0
12	1.1	1.2	1.45	1.25	1.0	1.6	2.1	....	1.3	1.3	.8	.95
13	1.1	1.2	1.4	1.2	1.0	1.6	2.2	1.3	1.3	1.3	.85	1.0
14	1.1	1.2	1.45	1.2	1.0	1.6	2.2	1.3	1.3	1.3	.95	1.15
15	1.1	1.2	1.5	1.2	1.0	1.6	2.2	1.3	1.3	1.3	1.15	1.45
16	1.1	1.2	1.45	1.2	1.0	1.6	2.2	1.25	1.3	1.3	1.15	1.45
17	1.1	1.2	1.5	1.2	1.0	1.6	2.3	1.25	1.3	1.3	.85	......
18	1.1	1.2	1.4	1.2	1.0	1.4	2.35	1.25	1.3	1.3	.8	......
19	1.1	1.2	1.4	1.2	1.0	1.4	2.45	1.2	1.3	1.3	.7	......
20	1.1	1.2	1.4	1.2	1.0	1.4	2.7	1.2	1.3	1.3	.6	......
21	1.1	1.2	1.4	1.2	1.1	1.4	3.45	1.2	1.3	1.3	.6	......
22	1.1	1.2	1.4	1.2	1.05	1.4	3.3	1.2	1.3	1.3	.6	......
23	1.1	1.2	1.4	1.2	1.05	1.4	4.0	1.2	1.3	1.3	.6	......
24	1.1	1.2	1.4	1.2	1.05	1.4	3.4	1.35	1.3	1.4	.65	......
25	1.1	1.25	1.4	1.2	1.05	1.4	2.7	1.3	1.3	1.4	.65	......
26	1.1	1.3	1.5	1.2	1.0	1.4	2.3	1.3	1.3	1.5	.5	......
27	1.1	1.3	1.5	1.2	1.0	1.4	2.05	1.3	1.3	1.6	.55	......
28	1.1	1.3	1.5	1.2	1.25	1.5	2.0	1.3	1.3	1.35	.5	......
29	1.1	....	1.5	1.2	2.8	1.4	2.0	1.3	1.3	1.0	.5	......
30	1.15	....	1.5	1.2	3.55	1.4	2.0	1.3	1.3	1.0	.65	......
31	1.1	....	1.5	....	2.45	....	1.95	1.3	....	1.05	....	......

NOTE.—Gage heights Oct. 25 to Dec. 16, 1911, are referred to a new datum.

Daily discharge, in second-feet, of Arkansas River at Holly, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	58	58	70	54	6	102	13	62	5	5	135	302
2	58	58	90	45	6	102	21	50	5	2	235	490
3	58	58	118	42	6	102	21	33	5	2	545	490
4	58	58	118	37	6	102	33	50	5	2	490	388
5	58	58	67	35	6	33	33	320	5	2	752	340
6	58	58	75	33	6	33	33	210	5	5	610	435
7	58	58	75	31	6	33	410	210	5	5	545	340
8	52	58	75	30	5	33	240	140	5	5	545	302
9	52	58	70	28	3	33	180	73	5	5	830	302
10	55	58	70	30	2	33	210	62	5	5	830	435
11	52	58	70	17	2	33	180	21	5	5	1,340	340
12	52	58	64	15	2	33	180	2	5	5	205	302
13	52	58	58	8	2	33	240	8	5	5	235	340
14	52	58	60	6	2	33	240	8	5	21	302	400
15	52	58	68	6	2	33	240	8	5	21	490	400
16	52	58	60	6	2	33	240	7	5	21	490	400
17	52	58	65	6	2	33	320	7	5	21	235	400
18	52	58	52	6	2	13	365	7	5	21	205	400
19	52	58	52	6	2	13	465	6	5	21	155	400
20	52	58	50	6	2	13	790	6	5	21	115	400
21	52	58	48	6	4	13	2,400	6	5	25	115	450
22	52	58	48	6	3	13	2,020	6	5	35	115	450
23	52	58	46	6	3	13	3,940	6	5	30	115	450
24	52	58	45	6	3	13	2,270	10	5	35	135	450
25	52	61	45	6	3	13	790	8	5	35	135	450
26	52	65	54	6	2	13	320	8	5	90	80	450
27	52	65	54	6	2	13	159	8	5	100	98	450
28	52	65	54	6	7	21	138	8	5	90	80	450
29	52	....	54	6	950	13	138	8	2	340	80	450
30	55	....	54	6	2,666	13	138	8	5	340	135	450
31	52	....	54	....	465	....	120	8	....	388	....	450

NOTE.—Daily discharge determined by indirect method for shifting channels. Discharge Aug. 12, Dec. 8, and Dec. 17–31 estimated.

Monthly discharge of Arkansas River at Holly, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	58	52	53.9	3,290
February	65	58	58.8	3,270
March	118	45	64.0	3,930
April	54	6	16.9	1,000
May	2,660	2	135	8,290
June	102	13	33.8	2,010
July	3,940	13	545	33,500
August	320	2	44.3	2,720
September	5	2	5.0	298
October	388	2	55.1	3,390
November	1,340	80	346	20,600
December	490	302	405	24,900
The year	3,940	2	148	107.000

NOTE.—Accuracy notes not given, as the entire record was furnished by the State engineer of Colorado.

TENNESSEE FORK NEAR LEADVILLE COLO.

Location.—At highway bridge in sec. 16, T. 9 S., R. 80 W., a few hundred yards above the mouth of the stream and about 3 miles northwest of Leadville.

Records available.—February 8, 1911, to December 31, 1911.

Drainage area.—45 square miles, measured from topographic sheet.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 24 second-feet above the station.

Accuracy.—As the station has not been completely rated, no estimates of daily discharge have been made.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Tennessee Fork near Leadville, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 8[a]	O. M. Wimmer	0.13	7.2	Aug. 2	O. M. Wimmer	0.15	22.4
Apr. 10[a]	.....do	.20	19.3	Sept. 14	.....do	.00	13.6
June 5	.....do	.80	169	Dec. 25	H. B. Waha	[b] —.2	11.6
July 11	.....do	.25	59.1				

[a] Slight ice affect.

[b] Approximate gage height affected by ice.

Daily gage height, in feet, of Tennessee Fork near Leadville, Colo., for 1911.

[M. F. Frey, observer.]

Day.	Feb.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.1		0.65						
2			0.3		0.45	0.15				
3									0.15	
4			.7		.45					
5				.80			0			
6								0.2		
7					.35					
8	0.15								.2	
9					.3					0.5
10		.2				.15				
11			.6	.6	.25	.15				
12			.5							
13				.5						
14						.05	0	0		
15		0								
16			.6		.15	.05		−.1		
17						.05			.3	
18				.5		.05				.2
19			.9							
20										
21		0	.6	.45					.45	
22										
23								.15		
24		.4		.4						
25				.4						−.2
26		.8								
27		.4		.25		.05				
28						.05				
29		.7					.1			
30			.7							
31			.7							

NOTE.—Gage heights affected by ice Jan. 1 to Apr. 14 and Oct. 23 to Dec. 31, 1911.

HALF MOON CREEK NEAR LEADVILLE, COLO.

Location.—In sec. 6, T. 10 S., R. 80 W., 1 mile above mouth of stream and 6 miles southwest of Leadville; no tributaries between the two points.

Records available.—April 10, 1911, to December 12, 1911.

Drainage area.—30 square miles, measured from topographic sheet.

Gage.—Vertical staff.

Channel.—Rough, but apparently permanent.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months and records are discontinued.

Diversions.—There are court decrees for diversions of 12 second-feet above the station.

Accuracy.—As the station has not been completely rated as yet, no estimates of discharge have been made.

Cooperation.—This station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Half Moon Creek near Leadville, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 10[a]	O. M. Wimmer	0.20	4.7
June 5	.....do	.95	121
July 11	.....do	.70	66.5
Sept. 14	.....do	.55	19.3
Dec. 24[b]	H. B. Waha		3.0

[a] Gage height affected by ice. [b] Discharge estimated. Gage height could not be determined because of ice.

Daily gage height, in feet, of Half Moon Creek near Leadville, Colo., for 1911.

[M. F. Frey, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				0.8	0.6	0.6	0.5	0.5	
2				.95	.6	.6	.45	.5	
3		0.3	0.6	1.0	.6	.6	.45		
4				1.0	.6	.55	.5		
5		.4	.75	1.0	.6	.5	.5		
6				1.05	.5	.5	.6		
7				1.0	.5	.5	.6		
8		.6		1.05	.5	.5	.6		
9				1.0	.5	.5	.6	.4	
10	0.2	.5		.9	.5	.5	.6	.4	
11				.8	.6	.5	.6		
12			.65	.8	.6	.5	.5		1.6
13				.8		.5	.5		
14		.4		.8		.5	.5		
15		.4		.8		.5	.5		
16				.8		.5	.5		
17				.85			.5		
18				.9			.5	.5	
19	.3			.8			.6		
20				.8	.5		.6		
21				.7	.6		.6		
22			1.2	.75	.75		.6		
23			1.15	.8	.75		.6		
24	.2		1.15	.7	.75		.6		
25			1.05	.7	.65		.6		
26			1.05	.7	.65		.55		
27	.3		.9	.7	.6		.5		
28			1.0	.7	.6		.5		
29		.65	.95	.7	.6		.5		
30			.8	.7	.6		.5		
31		.7		.65	.6		.5		

NOTE.—Gage height Dec. 12 affected by ice.

COTTONWOOD CREEK NEAR BUENA VISTA, COLO.

Location.—In the Leadville National Forest, 1 mile west of Hot Springs Hotel, in sec. 21, T. 14 S., R. 79 W., and 7 miles west of Buena Vista; 1 mile below mouth of South Fork, the nearest tributary.

Records available.—September 25, 1910, to September 13, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff; datum unchanged.

Channel.—Very rough, but apparently permanent. There is a small diversion dam 100 yards below, but the fall is so heavy that backwater from the dam does not affect the gage heights.

Discharge measurements.—Made by wading.

Winter flow.—Hot springs above the station keep the river open during the winter.

Diversions.—There are court decrees for diversions of 133 second-feet from Cottonwood Creek, nearly all below the station.

Accuracy.—As this station has not been fully rated no estimates have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Cottonwood Creek near Buena Vista, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 6	O. M. Wimmer	1.00	13.6
Mar. 11	do	1.03	17.1
Apr. 7	do	1.08	21.4

Daily gage height, in feet, of Cottonwood Creek near Buena Vista, Colo., for 1911.

[C. A. Mack, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1						2.20		1.75	1.55
2						2.10		1.70	1.55
3						2.10	2.10		1.50
4						2.20			1.50
5							1.90	1.60	1.50
6		1.00			1.45	2.30	1.90	1.60	1.50
7				1.10	1.40	2.30		1.60	1.50
8							1.90	1.55	1.50
9						2.30		1.55	1.50
10					1.70	2.30	2.15	1.50	1.50
11			1.03		1.75			1.50	1.50
12				1.10		2.35	2.10	1.50	1.50
13	1.20		1.05		1.70			1.50	1.50
14				1.10				1.45	
15					1.65	2.35	2.05	1.45	
16						2.35	2.00	1.40	
17					1.72	2.30	2.00		
18	1.20						1.90	1.35	
19						2.30	1.90	1.30	
20							1.95	1.30	
21					1.50		1.95		
22				1.20	1.60	2.40	1.90	1.35	
23					1.60	2.40	1.90		
24				1.10	1.70	2.25	1.90	1.35	
25					1.90	2.20	1.90		
26				1.09	2.00	2.20	1.80	1.30	
27					1.90		1.80	1.50	
28	1.15			1.35	1.90		1.80	1.55	
29				1.38	2.00	2.10	1.80	1.55	
30			1.2		2.00		1.75	1.55	
31	1.25				2.10		1.75	1.55	

COTTONWOOD CREEK BELOW HOT SPRINGS, NEAR BUENA VISTA, COLO.

Location.—In the Leadville National Forest, at bridge in sec. 22, T. 14 S., R. 79 W., half a mile below Hot Springs Hotel, and 6 miles west of Buena Vista; 2 miles below mouth of South Fork, the nearest tributary.

Records available.—April 9, 1911, to December 31, 1911.

Drainage area.—72 square miles, measured from Forest atlas.

Gage.—Vertical staff.

Channel.—Probably permanent.

Discharge measurements.—Made from bridge or by wading.

Winter flow.—The river is open during the winter months on account of hot springs above.

Accuracy.—Owing to the very rough condition of the stream bed the estimates can not be considered other than fair or possibly good.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 7	O. M. Wimmer	0.60	27.4	Sept. 13	O. M. Wimmer	0.90	52.3
June 12	do	2.00	240	Oct. 13	do	1.10	77.3
July 2	do	1.80	240	Dec. 28	H. B. Waha	.70	46.6
Aug. 1	do	1.40	105				

Daily gage height, in feet, of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., for 1911.

[E. D. Masters, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	0.75	1.95	2.0	1.5	1.1	1.1	0.8	0.8
2	....	.7	2.0	2.2	1.45	1.1	1.1	.8	.8
3	....	.7	2.0	2.2	1.4	1.1	1.0	.8	.8
4	....	.7	2.0	2.1	1.3	1.1	1.0	.8	.8
5	....	.9	2.1	2.1	1.3	1.05	2.0	.8	.8
6	....	1.1	2.15	2.1	1.2	1.05	1.6	.8	.75
7	.6	1.1	2.2	2.1	1.2	1.0	1.4	.8	.75
8	.55	1.2	2.2	2.0	1.1	1.0	1.3	.8	.75
9	.6	1.3	2.2	2.0	1.1	1.0	1.2	.8	.75
10	.6	1.1	2.1	2.0	1.1	1.0	1.2	.85	.7
11	.65	1.1	2.2	1.9	1.1	1.0	1.1	.9	.7
12	.55	1.0	2.2	1.9	1.1	1.0	1.1	.9	.7
13	.4	1.1	2.2	1.95	1.1	1.0	1.0	.9	.7
14	.6	1.1	2.2	2.0	1.1	1.0	1.0	.85	.7
15	.55	1.1	2.1	1.9	1.05	.95	1.0	.85	.7
16	.55	1.3	2.1	1.8	1.05	.9	1.0	.8	.7
17	.6	1.3	2.1	1.8	1.0	.9	1.0	.8	.7
18	.6	1.4	2.1	1.8	1.0	.9	1.0	.8	.7
19	.6	1.5	2.1	1.8	1.0	.9	1.0	.8	.7
20	.55	1.3	2.1	2.1	1.0	.9	.9	.8	.7
21	.7	1.1	2.2	2.1	1.1	.9	.9	.8	.7
22	.65	1.2	2.2	2.0	1.1	.9	.9	.8	.7
23	.6	1.2	2.1	1.9	1.2	.9	.9	.8	.7
24	.6	1.3	2.0	1.9	1.2	.9	.9	.8	.7
25	.6	1.5	2.0	1.8	1.1	.9	.9	.8	.7
26	.7	1.7	2.0	1.75	1.1	.9	.9	.8	.7
27	.7	1.6	2.0	1.7	1.1	.9	.9	.8	.7
28	.8	1.5	2.0	1.6	1.1	.8	.9	.8	.7
29	.9	1.8	2.0	1.6	1.2	.8	.9	.8	.7
30	.8	1.85	2.0	1.55	1.2	1.1	.9	.8	.7
31	....	1.8	....	1.5	1.1	....	.9	....	.7

Daily discharge, in second-feet, of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	38	244	256	146	77	77	43	43
2	....	34	256	304	136	77	77	43	43
3	....	34	256	304	126	77	64	43	43
4	....	34	256	280	108	77	64	43	43
5	....	53	280	280	108	70	256	43	43
6	....	77	292	280	92	70	166	43	38
7	27	77	304	280	92	64	126	43	38
8	24	92	304	256	77	64	108	43	38
9	27	108	304	256	77	64	92	43	38
10	27	77	280	256	77	64	92	48	34
11	30	77	304	232	77	64	77	53	34
12	24	64	304	232	77	64	77	53	34
13	16	77	304	244	77	64	64	53	34
14	27	77	304	256	77	64	64	48	34
15	24	77	280	232	70	58	64	48	34
16	24	108	280	210	70	53	64	43	34
17	27	108	280	210	64	53	64	43	34
18	27	126	280	210	64	53	64	43	34
19	27	146	280	210	64	53	64	43	34
20	24	108	280	280	64	53	53	43	34
21	34	77	304	280	77	53	53	43	34
22	30	92	304	256	77	53	53	43	34
23	27	92	280	232	92	53	53	43	34
24	27	108	256	232	92	53	53	43	34
25	27	146	256	210	77	53	53	43	34
26	34	188	256	199	77	53	53	43	34
27	34	166	256	188	77	53	53	43	34
28	43	146	256	166	77	43	53	43	34
29	53	210	256	166	92	43	53	43	34
30	43	221	256	156	92	77	53	43	34
31	....	210	....	146	77	....	53	....	34

NOTE.—Daily discharge determined from a fairly well defined curve.

Monthly discharge of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., for 1911.

[Drainage area 72 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April 7-30	53	16	29.5	0.410	0.37	1,400	B.
May	221	34	105	1.46	1.68	6,460	B.
June	304	244	278	3.86	4.31	16,500	C.
July	304	146	235	3.26	3.76	14,400	C.
August	146	64	85.5	1.19	1.37	5,260	B.
September	77	43	60.6	.842	.94	3,610	B.
October	256	53	76.1	1.06	1.22	4,680	B.
November	53	43	44.5	.618	.69	2,650	B.
December	43	34	36.0	.500	.58	2,210	C.
The period						57,200	

NORTH COTTONWOOD CREEK NEAR BUENA VISTA, COLO.

Location.—At highway bridge in sec. 10, T. 14 S., R. 79 W., 6 miles northwest of Buena Vista; just below a small stream entering from the west, and 1½ miles below mouth of Silver Creek.

Records available.—October 5, 1911, to December 31, 1911.

Drainage area.—50 square miles, measured from Forest atlas.

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Data too meager to determine.

Diversions.—There are court decrees for diversions of 32 second-feet from North Cottonwood Creek.

Accuracy.—As the station has not been completely rated estimates of discharge can not be made.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Discharge measurements of North Cottonwood Creek near Buena Vista, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 4	O. M. Wimmer	4.30	24.8
13	do	4.40	29.4
Dec. 28	H. B. Waha	2.90	8.7

Daily gage height, in feet, of North Cottonwood Creek near Buena Vista, Colo., for 1911.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		4.3	4.1	16			
2				17	4.2		
3		4.2		18			4.0
4	4.3			19			
5	4.4		4.05	20	4.35	4.2	
6		4.25		21			
7	4.6		4.05	22	4.35		3.9
8		4.25	4.05	23		4.2	
9				24			
10				25			
11		4.35		26	4.4		3.9
12		4.35	4.0	27		4.2	
13	4.4			28	4.4		3.9
14				29		4.15	
15	4.2	4.3	4.0	30	4.35		
				31			

NOTE.—Gage heights slightly affected by ice during the last of December.

CHALK CREEK NEAR ST. ELMO, COLO.

Location.—In the Leadville National Forest, at highway bridge in sec. 28, T. 15 S., R. 79 W., just below the cascades of Chalk Creek, and 6 miles east of St. Elmo. Nearest tributary is a small intermittent stream entering from the north just below the station.

Records available.—March 10 to December 25, 1911.

Drainage area.—75 square miles, measured from Forest atlas.

Gage.—Vertical staff.

Channel.—Permanent.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Data too meager to determine.

Diversions.—There are no court decrees for diversions from Chalk Creek above the station, but below there are decrees for 132 second-feet.

Accuracy.—Conditions are favorable for accurate results and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Chalk Creek near St. Elmo, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 9 [a]	O. M. Wimmer	0.70	12.4	Aug. 3	O. M. Wimmer	1.45	112
Apr. 9	do	.82	16.0	Sept. 13	do	1.20	45.0
June 13	do	1.90	379	Oct. 12	do	1.40	89.0
July 3	do	1.80	321	Dec. 29 [a]	H. B. Waha	1.10	24.4

[a] Some ice on right bank.

Daily gage height, in feet, of Chalk Creek near St. Elmo, Colo., for 1911.

[A. J. Smith, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			1.25	1.80	1.70	1.55	1.30	1.52	1.20	1.10
2		0.72	1.28	1.82		1.50	1.30	1.42		1.10
3		.74	1.30	1.82		1.45	1.30	1.40		1.10
4		.75	1.30	1.85		1.45	1.30	1.50		1.00
5		.75	1.38	1.90	1.80	1.40	1.28	1.90		1.00
6		.75	1.45	1.95	1.88	1.38	1.26	1.90		1.00
7		.75	1.50	2.00	1.80	1.35	1.25	1.80		1.00
8		.75	1.52	2.15		1.30	1.20			1.00
9	0.70	.82	1.55	2.20		1.30	1.20		1.15	1.00
10	.70	.75	1.52	2.15		1.30	1.20	1.50	1.15	1.00
11		.74	1.44	2.00		1.30	1.20	1.50	1.15	1.00
12		.72	1.50	1.95		1.30	1.20	1.45	1.20	1.00
13		.72		1.98		1.30	1.20	1.40	1.50	1.00
14	1.05	.72		1.98	1.70	1.30	1.20	1.40	1.40	1.00
15	.86	.72	1.50	1.98	1.68	1.30	1.20	1.40	1.15	1.00
16	.70	.72	1.58	1.98	1.65	1.30	1.20	1.40	1.10	1.00
17	.70	.72	1.62	1.98	1.65	1.30	1.20	1.40	1.10	1.00
18	.70	.70	1.66	1.98	1.65	1.30	1.20	1.40	1.10	1.00
19	.92		1.66	1.92	1.65	1.30	1.20	1.40	1.10	1.00
20	.69		1.58	1.92	1.65	1.30	1.20	1.40	1.10	1.00
21	.70	.90	1.50		1.68	1.32	1.20	1.40	1.10	1.00
22	.70	.95	1.50	1.92	1.78	1.60	1.20	1.40	1.10	1.00
23	.70	1.00	1.55	1.92		1.58	1.20	1.38	1.10	1.00
24	.70	.98	1.72	1.92	1.72	1.52	1.20	1.35	1.10	1.00
25	.70	.98	1.72	1.90	1.70	1.50	1.20	1.30	1.10	.95
26	1.30	.98	1.70	1.82	1.70	1.42	1.20	1.30	1.10	
27	.70	1.15	1.70	1.80	1.68	1.42	1.20	1.30	1.10	
28	.85	1.20		1.75	1.65	1.38	1.20	1.30	1.10	
29	.70	1.30		1.75	1.65	1.35	1.52	1.25	2.00	
30	.70		1.75	1.75	1.62	1.32	1.52	1.22	2.00	
31			1.78		1.58	1.30		1.22		

NOTE.—Gage heights affected by ice Mar. 14, 15, 19, 20, 26, 28, and Nov. 12 to 14, 29, and 30, 1911.

Daily discharge, in second-feet, of Chalk Creek near St. Elmo, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		14	50	315	250	162	60	146	40	29
2		14	56	328	266	135	60	97	39	29
3		14	60	328	282	112	60	88	38	29
4		14	60	348	299	112	60	135	37	22
5		14	82	380	315	88	56	380	37	22
6		14	112	412	367	82	52	380	36	22
7		14	135	445	315	74	50	315	36	22
8		14	146	550	305	60	40	255	35	22
9	13	17	162	585	295	60	40	195	34	22
10	13	14	146	550	285	60	40	135	34	22
11	13	14	107	445	280	60	40	135	34	22
12	13	14	135	412	270	60	40	112	34	22
13	13	14	135	432	260	60	40	88	34	22
14	13	14	135	432	250	60	40	88	34	22
15	13	14	135	432	238	60	40	88	34	22
16	13	14	179	432	220	60	40	88	29	22
17	13	14	202	432	220	60	40	88	29	22
18	13	13	226	432	220	60	40	88	29	22
19	13	15	226	393	220	60	40	88	29	22
20	13	17	179	393	220	60	40	88	29	22
21	13	19	135	393	238	66	40	88	29	22
22	13	20	135	393	302	190	40	88	29	22
23	13	22	162	393	282	179	40	82	29	22
24	13	21	263	393	263	146	40	74	29	22
25	13	21	263	380	250	135	40	60	29	20
26	13	21	250	328	250	97	40	60	29	
27	13	34	250	315	238	97	40	60	29	
28	13	40	260	282	220	82	40	60	29	
29	13	60	270	282	220	74	146	50	29	
30	13	55	282	282	202	66	146	44	29	
31	13		302		179	60		44		

NOTE.—Daily discharge determined from a well-defined curve. Discharge estimated Mar. 14, 15, 19, 20, 26, 28, Nov. 12-14, 29, 30, and Dec. 26-31. Discharge interpolated on all other days for which gage heights are not published.

Monthly discharge of Chalk Creek near St. Elmo, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
Mar. 9-31	13	13	13.0	593	B.
April	60	13	20.0	1,190	A.
May	302	50	169	10,400	A.
June	585	282	397	23,600	A.
July	367	179	259	15,900	A.
August	190	60	88.3	5,430	A.
September	146	40	51.0	3,030	A.
October	890	44	122	7,500	A.
November	40	29	32.4	1,930	A.
December	29	....	22.6	1,390	A.
The period	....	....	....	71,000	

NOTE.—Discharge estimated at 22 second-feet during Dec. 26-31, 1911.

SOUTH FORK OF ARKANSAS RIVER AT PONCHA, COLO.

Location.—At highway bridge about half a mile from Poncha, in sec. 10, T. 49 N., R. 8 E. Nearest tributary, Poncha Creek, enters one-fourth mile below.

Records available.—January 14, 1911, to December 31, 1911.

Drainage area.—140 square miles, measured from Forest atlas.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Springs keep this stream open during the winter months.

Diversions.—There are court decrees for diversions of 113 second-feet from the South Fork above the station, and 66 second-feet below. There are also decrees for diversions of 76 second-feet from the North Fork, which enters above.

Accuracy.—As the station has not been completely rated no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of South Fork of Arkansas River at Poncha, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 14	O. W. Wimmer	0.40	31.0
Mar. 13	.....do	.33	31.1
Aug. 7	.....do	— .20	6.6
Dec. 12	H. B. Waha	.50	46.1

Daily gage height, in feet, of South Fork of Arkansas River at Poncha, Colo., for 1911.

[J. M. Cuenin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	0.30	0.30	0.10	0.15	1.30	1.57	0.76	0.03	0.90	0.60	0.80
2	......	.20	......	.10	.23	1.47	1.76	.63	.06	1.40	.60	.60
3	......	.30	.40	.20	.13	1.40	1.56	.46	−.10	1.16	.53	.56
4	......	.30	.40	.12	.06	1.50	1.76	.26	−.13	1.43	.56	.53
5	......	.40	.30	.00	−.15	1.77	[b]2.86	.23	−.26	1.36	.70	.53
6	......	.20	.30	−.10	.20	1.70	[c]2.50	......	−.13	1.33	.90	.53
7	......	.20	.40	−.20	.57	1.97	2.10	−.20	−.20	.96	.86	.53
8	......	.10	.30	−.25	.73	1.73	1.73	−.10	−.10	.96	.86	.53
9	......	.20	.30	−.20	.83	[a]2.27	1.63	−.20	−.03	.86	.76	.53
10	......	.50	.40	−.18	.90	1.90	1.33	−.23	.06	.90	.66	.50
11	......	.50	.40	−.15	.43	1.73	1.26	−.13	−.03	.73	.63	.53
12	......	.40	.30	−.22	.20	1.73	1.30	+.03	−.13	.73	.70	.53
13	......	.40	.30	−.25	.15	1.40	1.40	.03	−.03	.56	.66	.53
14	0.40	.20	.20	−.20	.15	1.60	1.36	.03	−.10	.60	.70	.40
15	.40	.20	.20	−.30	.35	2.23	1.33	−.16	.00	.66	.70	.50
16	.30	.30	.10	−.30	.35	2.00	1.43	−.16	.03	.60	.70	.46
17	.40	.30	.00	−.05	.50	1.83	1.43	−.16	.00	.63	.70	.35
18	.30	.30	.00	−.20	.68	1.73	1.62	.00	.10	.60	.83	.30
19	.40	.30	.10	−.25	1.26	1.80	1.63	−.13	.10	.56	.76	.40
20	.40	.30	.10	−.25	.68	1.87	1.50	−.13	.36	.56	.76	.30
21	.40	.30	.05	.20	.55	1.83	1.43	−.03	.23	.43	.70	.45
22	.40	.30	.10	.20	.47	1.77	1.40	1.16	.30	.56	.66	.40
23	.30	.30	.15	.28	.37	1.70	1.60	1.03	.20	.58	.93	.30
24	.30	.30	.05	.30	.60	1.50	1.46	.56	.13	.66	.80	.45
25	.40	.30	.06	.22	.67	1.57	1.26	.46	.20	.60	.76	.35
26	.30	.30	.00	.30	.73	1.22	1.36	.33	.36	.63	.76	.35
27	.30	.30	.00	.25	.83	1.00	1.33	.16	.16	.60	.73	.35
28	.30	.40	.05	.20	.97	.80	1.16	.23	.16	.53	.90	.40
29	.40	......	.10	.33	1.17	.80	1.30	.26	.06	.43	1.00	.45
30	.40	......	.05	.30	1.17	1.25	1.26	.60	.20	.50	.90	.35
31	.40	......	.10	......	1.20	1.00	.96	.46	......	.66	......	.40

[a] Maximum gage height 3 feet. [b] Maximum gage height, 4.2 feet. [c] Maximum gage height, 3.4 feet.

NOTE.—Negative readings during April are not reliable as they were not made at the gage.

PONCHA CREEK AT PONCHA, COLO.

Location.—At highway bridge in sec. 10, T. 49 N., R. 8 E., near Poncha, about one-fourth mile above the mouth of creek.

Records available.—January 14, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Springs prevent the creek from freezing to any considerable extent.

Diversions.—There are court decrees for diversions of 7 second-feet above the station, but none below.

Accuracy.—As the station has not been completely rated no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Poncha Creek at Poncha, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 14	O. M. Wimmer	0.50	7.2
Mar. 13	....do	.35	2.7
Aug. 7	....do	.70	30.5
Dec. 12	H. B. Waha	.50	7.6

Daily gage height, in feet, of Poncha Creek at Poncha, Colo., for 1911.

[J. M. Cousin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	0.40	0.50	0.40	0.95	1.87	1.87	0.87	0.70	0.83	0.83	0.50
2	....	.30	....	.40	.95	1.73	1.60	.87	.73	.90	.46	.60
3	....	.40	.50	.90	.85	1.77	1.46	.87	.80	.70	.43	.56
4	....	.40	.50	.60	1.08	1.67	1.60	.80	.83	.73	.40	.56
5	....	.50	.50	.55	1.13	1.70	1.50	.83	.73	.80	.66	.56
6	....	.40	.50	.55	1.10	1.70	1.83	.93	.60	.86	.76	.56
7	....	.30	.60	.55	1.57	1.43	1.80	.80	.83	.86	.70	.56
8	....	.40	.50	.50	1.67	1.60	1.40	.77	.68	.76	.76	.56
9	....	.40	.50	.55	1.77	1.50	1.28	.70	.60	.80	.73	.53
10	....	.60	.60	.55	1.90	1.60	1.13	.87	.63	.86	.70	.53
11	....	.50	.60	.58	1.57	1.57	.93	.67	.60	.80	.73	.56
12	....	.50	.40	.52	1.53	1.40	.90	.77	.60	.76	.70	.56
13	....	.50	.40	.50	1.40	1.50	.90	.77	.60	.80	.66	.53
14	0.50	.40	.35	.50	1.53	1.30	1.16	.77	.68	.83	.70	.43
15	.50	.40	.40	.55	1.70	1.53	1.20	.60	.60	.76	.70	.60
16	.50	.50	.55	.55	1.60	1.33	.96	.60	.57	.83	.73	.30
17	.50	.50	.60	.55	1.73	1.20	1.36	.83	.68	.86	.76	.35
18	.50	.50	.60	.70	1.98	1.28	1.33	.80	.60	.73	.60	.35
19	.50	.50	.40	.75	2.07	1.33	1.50	.83	.68	.63	.66	.35
20	.50	.50	.60	.70	1.73	1.13	1.43	.83	.57	.70	.70	.35
21	.50	.50	.50	.95	1.57	1.13	1.40	.80	.68	.56	.66	.35
22	.50	.50	.60	1.00	1.60	1.10	1.50	1.00	.68	.66	.56	.35
23	.50	.50	.55	1.00	1.47	.97	1.60	1.00	.60	.76	.70	.35
24	.50	.50	.50	1.00	1.60	.97	1.53	.97	.63	.70	.70	.45
25	.50	.50	.50	1.00	1.70	.97	1.40	.90	.60	.70	.56	.40
26	.50	.40	.30	1.10	1.67	1.13	1.53	.80	.67	.73	.66	.30
27	.50	.40	.20	1.10	1.80	1.10	1.28	.77	.60	.63	.63	.35
28	.50	.50	.30	1.10	1.73	1.08	1.16	.80	.53	.00	.53	.30
29	.50	....	.40	1.10	1.83	1.07	1.10	.83	.60	.53	.56	.40
30	.50	....	.40	1.28	1.80	1.07	1.43	.77	.73	.53	.70	.30
31	.50	....	.40	....	1.83	....	1.13	.73	....	.56	....	.30

NOTE.—Gage heights affected by ice Dec. 17 to 31.

WEST BEAVER CREEK NEAR VICTOR, COLO.

Location.—At the Skagway power station of the Arkansas Valley Railway, Light & Power Co., in sec. 30, T. 16 S., R. 68 W., about 7 miles southeast of Victor.

Records available.—Monthly estimates from January 1, 1905, to December 31, 1911.

Drainage area.—70 square miles.

Method of compiling records.—The water used through the power house, which is brought by pipe line from the reservoir 3½ miles upstream, is measured hourly by weir. To this amount is added or subtracted a quantity representing the gain or loss in the reservoir during the period. The seepage through the reservoir is measured by weir and added to the above to obtain the final result. The record therefore represents the flow of the stream (less evaporation from the stored water) as if there were no reservoir.

Diversions.—Above the power reservoir the town of Victor has three reservoirs from which water is diverted for municipal purposes. Colorado Springs receives its water supply from four reservoirs in the upper basin. There are filings (which have not yet been adjudicated) for diversions from the basin of 52 second-feet by ditch and 5 second-feet by pipe line. This water is diverted into Lake Moraine, and thence by natural channels to Colorado Springs. The town of Altman, for municipal supply, has filed on five reservoir sites in the upper basin, having a combined capacity of 2,300 acre-feet. Below the power plant there are adjudicated decrees for diversions of 57 second-feet from Beaver Creek, which is formed by East and West Beaver creeks. In addition, there is an irrigation reservoir in operation which has a filing for 4,760 acre-feet.

Accuracy.—Company states that records are probably correct within 5 per cent.

Cooperation.—Records are furnished through courtesy of Arkansas Valley Railway, Light & Power Co.

Monthly discharge of West Beaver Creek near Victor, Colo. for 1905–1911.

Month	Mean discharge in second-feet.	Run-off (total in acre-feet).
1905.		
January	6.8	418
February	6.0	333
March	10.4	640
April	53.0	3,150
May	104	6,400
June	119	7,080
July	41.4	2,550
August	63.8	3,920
September	24.2	1,440
October	8.6	529
November	6.0	357
December	1.9	117
The year	37.1	26,900
1906.		
January	1.4	86
February	3.7	206
March	5.4	332
April	13.2	786
May	15.9	978
June	22.9	1,360
July	32.9	2,020
August	20.2	1,240
September	19.4	1,150
October	84.2	5,180
November	55.9	3,330
December	9.2	566
The year	23.6	17,200
1907.		
January	4.9	301
February	7.5	416
March	8.4	516
April	8.8	524
May	17.4	1,070
June	15.3	910
July	17.6	1,080
August	9.9	609
September	5.4	321
October	4.9	301
November	3.9	232
December	2.9	178
The year	8.9	6,460
1908.		
January	2.0	123
February	2.2	126
March	5.1	314
April	5.8	345
May	4.1	252
June	1.1	66
July	2.5	154
1908.		
August	7.5	461
September	2.9	173
October	2.9	178
November	3.0	179
December	1.9	117
The year	3.2	2,490
1909.		
January	2.1	129
February	1.2	67
March	2.8	172
April	14.1	839
May	8.0	492
June	9.3	553
July	8.8	541
August	27.3	1,680
September	53.2	3,170
October	12.2	750
November	8.7	518
December	12.9	793
The year	13.3	9,700
1910.		
January	8.5	523
February	5.9	328
March	25.8	1,590
April	25.3	1,510
May	41.2	2,530
June	19.5	1,160
July	10.5	646
August	15.4	947
September	11.4	678
October	9.2	566
November	7.4	440
December	7.0	430
The year	16.0	11,300
1911.		
January	5.5	338
February	4.0	222
March	8.3	510
April	12.2	726
May	14.3	879
June	6.6	393
July	18.8	1,160
August	19.2	1,180
September	11.2	666
October	9.3	572
November	5.6	333
December	4.1	252
The year	9.9	7,230

PURGATORY RIVER AT TRINIDAD, COLO.

Location.—At Animas Street Bridge at Trinidad, Colo. Nearest perennial tributary, Gray Creek, enters about 4 miles below.

Records available.—May 1, 1896, to July 31, 1899; August 25, 1905, to December 31, 1905; November 1, 1906, to March 10, 1907; October 14, 1907, to December 31, 1911. From March 23, 1905, to October 31, 1906, a station was maintained at Alfalfa, about 25 miles east of Trinidad.

Drainage area.—742 square miles.

Gage.—A chain gage since August 25, 1905; referred to a datum 1.70 feet below that of the original staff gage.

Channel.—Somewhat shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes some backwater during the winter period.

Diversions.—There are court decrees for diversions of 112 second-feet from Purgatory River above Trinidad and 348 second-feet below. There are decrees for diversions of 110 second-feet from tributaries entering above the station.

Accuracy.—Although the channel is somewhat shifting, sufficient measurements have been made to form a basis for estimates of flow, which may be considered good.

Cooperation.—Station maintained in cooperation with the State engineer of Colorado.

Discharge measurements of Purgatory River at Trinidad, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 18[a]	G. H. Russell	3.31	10.3	July 22	G. H. Russell	4.48	437
Feb. 18	.....do	3.41	4.5	Aug. 20	W. B. Freeman	3.48	38.2
Mar. 9	W. B. Freeman	3.41	15.6	24	Thos. Grieve	3.90	126
Apr. 10	Russell and Waha	3.06	2.1	Sept. 5	G. H. Russell	3.55	56.9
May 19	W. B. Freeman	3.86	69.0	Oct. 26	W. B. Freeman	3.88	67.2
July 1	G. H. Russell	3.60	54.7	Dec. 12	.....do	[b]3.78	7.0
21	.....do	9.50	6,100				

[a] Slight ice effect.

[b] Estimated.

Daily gage height, in feet, of Purgatory River at Trinidad, Colo., for 1911.

[H. D. Albertson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.38	3.4	3.55	3.3	3.52	4.4	3.8	3.85	3.55	3.3	3.9	3.63
2	3.38	3.4	3.72	3.3	3.5	3.95	3.82	3.8	3.55	3.5	3.9	3.68
3	3.35	3.4	3.85	3.3	3.5	3.92	3.9	3.77	3.55	3.5	4.0	3.78
4	3.38	3.4	3.58	3.4	3.42	3.92	4.4	3.7	3.5	3.5	4.0	3.86
5	3.38	3.4	3.66	3.18	3.52	3.95	5.02	3.65	3.5	6.0	4.0	3.86
6	3.38	3.4	3.65	3.15	3.72	3.98	6.33	3.65	3.45	4.9	3.9	3.86
7	3.38	3.38	3.52	3.12	3.78	3.98	4.0	3.6	3.45	4.6	3.85	3.8
8	3.42	3.38	3.42	3.05	3.98	4.0	4.45	3.55	3.45	4.5	3.8	3.78
9	3.42	3.38	3.38	3.0	4.08	4.0	4.05	3.55	3.45	4.5	3.75	3.78
10	3.4	3.38	3.35	3.0	4.1	4.06	4.0	3.75	3.45	4.45	3.7	3.78
11	3.4	3.38	3.35	3.05	4.08	4.01	3.9	3.75	3.45	4.35	3.7	3.88
12	3.4	3.38	3.35	3.05	4.0	4.0	4.45	3.73	3.45	4.3	3.7	3.78
13	3.4	3.38	3.35	3.05	3.8	4.0	4.1	3.6	3.45	4.3	3.7	3.86
14	3.4	3.38	3.3	3.02	4.2	4.0	5.7	3.55	3.53	4.25	3.72	4.23
15	3.35	3.42	3.3	3.0	4.0	4.1	6.35	3.55	3.57	4.2	3.75	3.88
16	3.38	3.45	3.3	3.0	4.0	4.0	6.8	4.0	3.55	4.08	3.75	3.78
17	3.4	3.4	3.3	3.0	3.9	3.92	4.05	3.7	3.55	4.0	3.75	3.8
18	3.4	3.4	3.45	3.0	3.9	4.38	7.3	4.25	3.55	4.0	3.8	3.78
19	3.4	3.35	3.42	3.0	3.85	4.8	4.8	3.55	3.53	4.0	3.75	4.33
20	3.4	3.35	3.4	3.0	3.85	3.92	4.6	3.55	3.5	4.12	3.75	4.73
21	3.4	3.35	3.4	3.0	3.85	3.92	4.9	3.55	3.47	4.1	3.7	4.48
22	3.4	3.35	3.4	3.0	3.86	4.9	4.1	3.83	3.45	4.0	3.7	4.03
23	3.4	3.35	3.42	3.0	3.82	4.1	4.5	3.95	3.45	3.93	3.75	3.88
24	3.35	3.38	3.45	3.0	3.8	3.92	4.65	4.3	3.45	3.9	3.72	3.88
25	3.32	3.38	3.45	3.7	3.8	3.85	4.12	4.75	3.45	3.9	3.7	3.98
26	3.35	3.4	3.45	3.35	3.55	3.75	4.1	3.8	3.4	3.9	3.72	4.23
27	3.35	3.4	3.45	3.12	3.55	4.22	4.05	3.7	3.4	3.9	3.75	4.18
28	3.38	3.4	3.45	3.15	3.7	3.7	4.1	3.75	3.35	3.9	3.72	4.18
29	3.4	....	3.32	3.15	3.9	3.75	4.4	3.7	3.35	3.9	3.7	4.05
30	3.4	....	3.3	3.1	3.88	3.75	4.28	3.65	3.35	3.9	3.72	4.03
31	3.35	....	3.3	....	3.96	....	4.05	3.6	....	3.9	....	4.03

NOTE.—Gage heights affected by ice Jan. 1 to 31 and Dec. 1 to 31.

Daily discharge, in second-feet, of Purgatory River at Trinidad, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9	8	15	10	30	200	100	115	50	21	74	5
2	9	8	38	10	27	94	106	100	50	42	74	5
3	8	8	58	10	27	88	130	93	50	42	88	7
4	9	8	28	16	22	87	350	75	42	42	88	7
5	9	8	34	6	30	95	714	66	42	1,120	88	7
6	9	8	38	5	51	102	1,850	66	36	390	74	7
7	9	6	24	4	65	101	170	57	36	260	70	9
8	10	6	18	3	90	108	375	50	36	220	65	7
9	10	6	15	2	112	108	190	50	36	230	50	7
10	10	6	15	2	116	120	170	88	36	220	40	7
11	10	6	15	3	112	109	130	88	36	180	40	12
12	10	6	15	3	96	120	375	82	36	160	30	7
13	10	6	15	3	61	120	210	57	36	160	30	7
14	10	6	10	2	138	120	1,200	50	46	150	20	7
15	8	7	10	2	96	140	1,850	50	52	140	15	7
16	9	7	10	2	96	125	2,400	170	50	100	15	7
17	10	5	10	2	75	100	190	75	50	88	10	7
18	10	5	20	2	75	220	3,100	278	50	88	10	7
19	10	5	18	2	68	400	570	50	46	88	10	7
20	10	5	16	2	68	110	450	50	42	115	10	7
21	10	5	16	2	68	110	630	50	38	110	10	7
22	10	5	16	2	68	475	210	109	36	88	10	7
23	10	5	18	2	64	150	400	150	36	78	10	7
24	8	5	20	2	62	120	480	300	36	74	10	7
25	8	5	20	48	62	92	219	540	36	74	10	7
26	8	6	20	16	31	76	210	100	30	74	7	7
27	8	6	20	6	34	190	190	75	30	74	7	7
28	9	6	20	7	50	70	210	88	25	74	7	7
29	10	......	12	7	82	77	350	75	25	74	7	7
30	10	......	10	5	80	77	291	66	25	74	7	7
31	8	......	10	......	93	......	190	57	......	74	......	7

NOTE.—Daily discharge determined as follows: Jan. 1–31, estimated; Feb. 1 to Mar. 9, by indirect method for shifting channels; May 10–19, from a fairly well defined curve; May 20 to July 1, by indirect method for shifting channels; July 2 to Nov. 6, from a fairly well defined curve; Nov. 7 to Dec. 31, estimated.

Monthly discharge of Purgatory River at Trinidad, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	10	8	9.3	571	C.
February	8	5	6.2	343	C.
March	58	10	19.5	1,200	B.
April	48	2	6.3	374	B.
May	138	22	69.3	4,260	B.
June	475	70	137	8,140	B.
July	3,100	100	581	35,700	B.
August	540	50	107	6,590	B.
September	52	25	39.2	2,330	B.
October	1,120	21	153	9,390	C.
November	88	7	32.9	1,960	C.
December	12	5	7.1	436	C.
The year	3,100	2	98.5	71,300	

BIG SANDY CREEK AT HUGO, COLO.

Location.—At highway bridge in sec. 32, T. 10 S., R. 54 W., half a mile south of Hugo. No important tributaries within several miles of the station.

Records available.—April 10, 1910, to October 31, 1911.

Drainage area.—Approximately 555 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Very shifting.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—The bed of the stream is usually dry during the winter months.

Diversions.—There are no court decrees for diversions from Big Sandy Creek.

Accuracy.—Owing to a lack of measurements no estimates of discharge for 1911 have been made.

Cooperation.—Station is maintained in cooperation with the Central Land & Irrigation Co.

Discharge measurements of Big Sandy Creek at Hugo, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 21	E. O. Christiansen	2.30	[a]0.2
July 7	G. H. Russell	[a]2.20	([b])
14	E. O. Christiansen		[a].2
18	G. H. Russell		0

[a] Estimated. [b] Very slight flow.

Daily gage height, in feet, of Big Sandy Creek at Hugo, Colo., for 1911.

[George Leonard, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		2.45	2.3	2.3	2.3		2.3
2		2.3	2.3	2.3	2.3		2.3
3		2.3	2.3	2.45	2.3	[b]2.8	2.3
4		2.3	2.3	2.8	2.3	2.3	2.3
5		2.35	2.3	2.45	2.3	2.3	2.3
6		2.3	2.3	2.3	2.3	2.3	2.3
7		2.3	2.3	2.3	2.3	2.3	2.3
8		2.3	2.3	2.3	2.3	2.3	2.3
9		2.3	2.3	2.8	2.3	2.3	2.3
10		2.3	2.3	2.3	2.3	2.3	2.3
11		2.3	2.3	2.8	2.3	2.3	2.3
12		2.3	2.3	2.45	2.3	2.3	2.3
13		2.3	2.3	2.3	2.3	2.3	2.3
14		2.3	2.3	2.7	2.3	2.3	2.3
15		2.3	2.4	2.3	2.3	2.3	2.3
16		2.3	2.3	2.3	2.3	2.3	2.3
17		2.3	2.4	2.3	2.3	2.3	2.3
18		2.3	2.3	2.3	2.3	2.3	2.3
19		2.3	2.3	2.3	2.3	2.3	2.3
20		2.3	2.3	2.3		2.3	2.3
21	2.3	2.3	2.3	2.3		2.3	2.5
22	2.3	2.3	2.3	2.3		2.3	2.35
23	2.45	2.3	2.3	2.3		2.3	2.3
24	2.45	2.3	2.3	2.3		2.3	2.3
25	2.4	2.3	2.3	2.3		2.3	2.3
26	2.35	2.3	2.3	2.3		2.3	2.3
27	2.3	2.3	2.3	2.3		2.3	2.3
28	2.3	2.35	2.3	2.3		2.3	2.3
29	2.25	[a]2.6	2.3	2.3		2.3	2.3
30	2.7	2.3	2.3	2.3		2.5	2.3
31		2.3		2.3			2.3

[a] Maximum gage height, 3.2 feet. [b] Maximum gage height, 3.5 feet.

NOTE.—No discharge Aug. 20 to Sept. 2, 1911.

BIG SANDY CREEK AT KIT CARSON, COLO.

Location.—At highway bridge in sec. 8, T. 15 S., R. 48 W., 1 mile west of Kit Carson, 1 mile above mouth of Wildhorse Creek, the nearest tributary.

Records available.—April 15, 1910, to October 31, 1911.

Drainage area.—Approximately 1,100 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Shifting; dry during the greater portion of the time.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Bed of this stream usually dry during the winter months.

Diversions.—There are no court decrees for diversions from Big Sandy Creek.

Accuracy.—There was flow during only five days in 1911; no discharge measurements were made.

Cooperation.—Station maintained in cooperation with the Central Land & Irrigation Co.

Discharge measurements of Big Sandy Creek at Kit Carson, Colo., in 1911.

Date.	Hydrographer.	Discharge.	Date.	Hydrographer.	Discharge.
		Sec.-ft.			*Sec.-ft.*
Apr. 19	E. O. Christiansen	0	July 14	E. O. Christiansen	0
20	.....do	0	18	G. H. Russell	0
July 8	G. H. Russell	0			

Daily gage height of Big Sandy Creek at Kit Carson, Colo., 1911.

[Cyrus Platner, observer.]

	Feet.		*Feet.*
May 28	1.3	July 16	1.2
May 29	1.25	July 17	1.0
May 30	.9		

NOTE.—Creek dry during remainder of year.

BIG SPRING CREEK NEAR ARENA, COLO.

Location.—In sec. 6, T. 15 S., R. 47 W., 1½ miles southwest of Arena. There is no tributary between the station and the mouth, 2 miles below.

Records available.—April 11, 1910, to October 23, 1911.

Drainage area.—Approximately 295 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months, and the records are discontinued.

Diversions.—There are no court decrees for diversions from Big Spring Creek.

Accuracy.—Owing to the meager data, no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the Central Land & Irrigation Co.

Discharge measurements of Big Spring Creek near Arena, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 20	E. O. Christiansen	1.50	0.0
July 8	G. H. Russell	2.00	8.3

Daily gage height, in feet, of Big Spring Creek near Arena, Colo., for 1911.

[James Cook, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		1.6	1.5		1.6	1.5	
2		1.6	1.5		1.6	1.5	
3		1.6	1.5		1.5	1.7	
4		1.6	1.5		1.5	1.6	
5		1.55			1.5	1.6	1.5
6		1.5			1.5	1.5	1.6
7		1.5		7.25	1.5	1.5	1.6
8		1.5		2.35	1.5	1.5	1.5
9		1.5		1.75	1.5	1.5	1.5
10		1.5		1.7	1.5	1.5	1.5
11		1.5		1.7	1.5	1.5	1.5
12		1.5		1.7	1.5	1.5	1.5
13		1.5		1.6	1.5	1.5	1.5
14		1.5		1.6	1.5	1.5	1.5
15		1.5		1.6	1.5		1.5
16		1.5		1.5	1.5		1.5
17		1.5		1.5			1.5
18		1.5		1.5			1.5
19		1.5		1.5			1.5
20	1.5	1.5		1.5			1.5
21	1.5	1.5		1.5			1.5
22	1.5	1.5		1.5			1.5
23	1.5	1.5					1.5
24	1.5	1.5					
25	1.6	1.5			1.45		
26	1.8	1.5			1.6		
27	1.6	1.5			1.6		
28	1.5	1.5			1.6		
29	1.6	1.5			1.6		
30	1.7	1.5			1.6		
31		1.5			1.5		

NOTE.—No water flowing in the creek on days for which gage heights are missing from Apr. 19 to Oct. 31.

CANADIAN RIVER AT LOGAN, N. MEX.

Location.—Three-fourths of a mile above railroad bridge in sec. 15, T. 13 N., R. 33 E., 1 mile south of Logan, 5 miles below mouth of Ute Creek, and about 5 miles above mouth of Arroyo Largo or Tucumcari Creek.

Records available.—June 29, 1904, to February 26, 1905; December 22, 1908, to December 31, 1911.

Drainage area.—Approximately 12,000 square miles.

Gage.—Automatic recording gage was installed August 5, 1910, at a point three quarters of a mile above bridge and referred to a datum different from that of gage previously used. The original gage was a staff. On the reestablishment of the station in 1908, a gage was painted on one of the bridge piers, but referred to a new datum. This gage was used until August 5, 1910, when the present gage was placed in position.

Channel.—Very shifting.

Discharge measurements.—Flood measurements are made by floats, owing to the great amount of drift carried in the stream. Measurements at ordinary stage are made from a car and cable, and at low water by wading.

Winter flow.—Ice causes slight backwater during a portion of the winter months.

Diversions.—Some water is diverted from the headwater streams, as irrigation is carried on quite actively, but there are no diversions from the Canadian itself.

Accuracy.—As the station as referred to the datum established in 1910 has not been completely rated, no estimates of discharge have been made.

Cooperation.—The station was maintained in cooperation with the Territorial engineer of New Mexico.

Discharge measurements of Canadian River at Logan, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 17	C. B. Digby	[a]4.0	[a]1.0	Aug. 1	Christiansen and Shepherd.	5.75	326
Apr. 5	G. H. Russell	3.5	.0	25	G. H. Russell	[b]7.80	6,040
May 20	do	5.25	100	Nov. 7	W. B. Freeman	5.45	82.0
22	do	4.81	83.4				

[a] Estimated.
[b] Gage height on automatic gage could only be determined approximately.

Daily gage height, in feet, of Canadian River at Logan, N. Mex., for 1911.

[Thomas Goodrich, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		4.3			6.2			7.4	6.2	5.7	5.1
2		4.2			5.6			7.2	5.6	5.7	5.1
3		4.15			5.6			6.9	5.3	5.7	5.1
4		4.2			5.2			6.0	5.3	5.7	5.2
5		4.2			4.6			5.55	5.3	5.6	5.2
6		4.15			3.9		5.4	4.9	5.5	5.6	5.2
7		4.1					5.4	4.5	5.9	5.45	5.25
8		4.0					5.3	4.7	5.8	5.45	5.25
9		3.9					5.2	[d]7.7	5.8	5.45	5.25
10		3.85					5.05	9.4	5.8	5.45	5.1
11		3.85					5.0	6.5	5.8	5.45	4.9
12		3.8		[a]6.7			4.95		5.7	5.45	4.8
13		3.8		6.2			4.9	6.0	5.7	5.45	4.8
14		3.8		6.0			4.8		5.7	5.45	4.8
15		3.8		7.0			4.7	5.4	5.6	5.45	4.8
16	4.0	3.9		6.9			4.7	5.0	5.5	5.4	4.8
17	4.0	3.9		6.2			4.65	4.9	5.5	5.4	4.8
18	4.0	3.9		5.8			4.6	4.8	5.4	5.4	4.8
19	4.0	3.85		5.45			4.55	4.8	5.4	5.4	4.8
20	4.0	3.8		5.1			4.5	4.75	5.4	5.4	4.8
21	4.0	3.8		5.0			4.5	4.7	5.4	5.4	4.85
22	4.0	3.8		4.8			4.5	4.8	5.4	5.4	4.9
23	4.0	3.8	5.5	4.75			6.0	4.8	5.4	5.35	4.9
24	4.0	3.8	4.5	4.6			6.0	4.75	5.4	5.25	4.9
25	4.0	3.8	4.25	4.5			[c]7.8	4.7	5.4	5.15	4.9
26	4.0	3.8	4.1	4.35			6.65	4.6	5.4	5.1	4.9
27	4.0	3.8	4.0	4.2				4.4	5.4	5.15	5.0
28	4.3		3.9	4.2			7.8	4.4	5.4	5.25	5.1
29			3.8	9.9			7.7	5.4	5.5	5.2	5.1
30				[b]10.1			7.65	5.8	5.6	5.18	5.2
31				8.6			7.5		5.7		5.2

[a] Maximum gage height, 8.25 feet.
[b] Maximum gage height, 14.0 feet.
[c] Maximum gage height, 8.8 feet.
[d] Maximum gage height, 10.5 feet.

NOTE.—The stream was dry on days for which gage heights are missing except Aug. 27, Sept. 12 and 14, when there was water flowing in the river. Gage heights affected by ice Nov. 28–30 and Dec. 4–31, 1911.

CHICO RICO CREEK NEAR RATON, N. MEX.

Location.—At St. Louis, Rocky Mountain & Pacific Railway bridge in sec. 21, T. 30 N., R. 24 E., and 10 miles southeast of Raton; above Raton and Una del Gato creeks.

Records available.—May 3, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Automatic recording gage; datum unchanged.

Channel.—Shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—The greater part of the normal flow is diverted above the station for irrigation.

Accuracy.—Owing to lack of measurements no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the Territorial engineer of New Mexico.

Discharge measurements of Chico Rico Creek near Raton, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 18	C. B. Digby	1.60	[a]1.0	July 19	G. H. Russell	3.50	[b]350
June 8	G. H. Russell		.0	22	.....do	1.28	[a].12
29	.....do	.20	.0				

[a] Estimated. [b] From Kutter's formula.

Daily gage height, in feet, of Chico Rico Creek near Raton, N. Mex., for 1911.

[Jay Walroth and E. T. Knox, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.60	1.60	1.00	1.55							1.15	1.20
2	1.60	1.60	1.00	1.55			1.45				1.15	1.20
3	1.60	1.60	1.60	1.50			1.30				1.20	1.30
4	1.60	1.60	1.60								1.20	1.40
5	1.60	1.60	1.60				1.50			1.90	1.20	1.40
6	1.00	1.60	1.60				1.75			1.30	1.15	1.40
7	1.65	1.60	1.60				1.45			1.20	1.15	1.40
8	1.80	1.60	1.60				1.30			1.20	1.15	1.40
9	1.90	1.60	1.60				1.25				1.15	1.40
10	1.95	1.60	1.75								1.15	1.40
11	2.20	1.60	2.05								1.10	1.40
12	2.15	1.60	1.90		1.45							1.40
13	2.15	1.60	1.75		1.50							1.40
14	2.15	1.60	1.65		1.75	[b]1.85						1.40
15	2.05	1.60	1.60		1.55	1.55						1.40
16	2.00	1.60	1.60		1.45	1.40	1.45					1.40
17	2.00	1.60	1.60		1.50	1.70	1.25				1.10	1.40
18	1.90	1.60	1.60		1.50	1.50					1.10	1.40
19	1.75	1.60	1.60		1.45		[c]1.70				1.10	1.35
20	1.75	1.60	1.60				1.60				1.15	1.35
21	1.60	1.60	1.55				1.35				1.15	1.30
22	1.60	1.60	1.55				1.28				1.15	1.30
23	1.60	1.60	1.55				1.50	1.40			1.15	1.30
24	1.60	1.60	1.55				1.45				1.15	1.30
25	1.65	1.60	1.55				1.25	1.65		1.20	1.18	1.30
26	1.70	1.60	1.55					1.50		1.20	1.20	1.30
27	1.70	1.60	1.55							1.25	1.20	1.30
28	1.60	1.60	1.55		1.20					1.20	1.20	1.30
29	1.60		1.55		[a]3.30					1.20	1.20	1.30
30	1.60		1.55		1.80				1.25	1.20	1.20	1.30
31	1.60		1.55							1.20	1.20	1.30

[a] Maximum gage height, 6.5 feet.
[b] Maximum gage height, 3.85 feet.
[c] Maximum gage height, 3.50 feet.

NOTE.—No flow on days for which gage heights are missing. Gage heights affected by ice Jan. 1–30, Feb. 22 to Mar. 4, and Nov. 16 to Dec. 31.

UNA DEL GATO CREEK NEAR RATON, N. MEX.

Location.—In sec. 13, T. 30 N., R. 25 E., about 2 miles northeast of Meloche's ranch and 18 miles southeast of Raton, N. Mex. No important tributary enters within several miles.

Records available.—May 3, 1910, to December 16, 1911.

Drainage area.—Not measured.

Gage.—An automatic recording gage.

Channel.—Probably shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes slight backwater during a portion of the winter months.

Artificial control.—A short distance above the station is a reservoir designed to hold the flood water for use in irrigation farther down the valley.

Accuracy.—Owing to lack of high-water measurements no estimates of discharge have been made.

Cooperation.—Station was maintained in cooperation with the Territorial engineer of New Mexico and Mr. A. J. Meloche, of Raton, N. Mex., who furnished the gage heights.

Discharge measurements of Una del Gato Creek near Raton, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 18	C. B. Digby	0.81	a 0.5	July 20	G. H. Russell	1.60	74.8
Apr. 9	G. H. Russell	.78	a .5	20	.....do	6.50	b 2,000
July 20	.....do	1.25	47.0	22	.....do	.20	a .1

a Estimate. b Estimated by use of Kutter's formula.

Daily gage height, in feet, of Una del Gato Creek, near Raton, N. Mex., for 1911.

[A. J. Meloche, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.80	0.80	0.85	0.80	0.80	1.20	0.80	0.55	0.20	0.10	0.17	0.30
2	.80	.80	.85	.80	.75	1.10	.80	.30	.20	.05	.18	.30
3	.80	.85	.90	.80	.75	1.00	.75	.35	.20	.00	.19	.40
4	.80	.80	.90	.80	.75	1.00	.70	.40	.20	.00	.20	.40
5	.80	.80	.90	.80	.75	1.00	.75	.20	.10	.05	.24	.40
6	.80	.80	.85	.80	.75	1.00	a 3.35	.35	.10	.05	.22	.40
7	.80	.85	.80	.80	.75	1.00	1.50	.25	.10	.00	.20	.40
8	.80	.80	.80	.80	.75	1.10	.80	.25	.15	.00	.17	.40
9	.80	.80	.80	.80	.75	1.05	.75	.20	.15	.00	.17	.40
10	.80	.75	.80	.80	.75	.80	.75	.15	.25	.00	.18	.25
11	.80	.80	.75	.80	.75	.80	.70	.25	.22	.00	.20	.35
12	.80	.85	.80	.80	.75	.80	.75	.20	.20	.00	.28	.70
13	.80	.80	.80	.80	.75	.80	.75	.20	.20	.00	.28	.80
14	.80	.85	.80	.80	1.00	.90	.90	.20	.20	.00	.22	.80
15	.70	.85	.80	.80	1.00	.85	a 2.20	.20	.20	.00	.25	.80
16	.75	.80	.80	.80	.90	.80	2.20	.25	.20	.10	.22	.80
17	.70	.85	.80	.80	.80	.80	.20	.20	.15	.12	.24	......
18	.75	.75	.80	.80	.80	.80	.20	.20	.18	.12	.22	......
19	.75	.80	.80	.80	.80	.95	.20	.15	.15	.12	.20	......
20	.75	.80	.70	.80	.80	1.00	b 2.00	.15	.20	.12	.22	......
21	.75	.80	.75	.80	.80	.85	1.50	.30	.15	.15	.23	......
22	.80	.80	.80	.80	.80	.85	.20	.30	.18	.15	.21	......
23	.80	.80	.75	.80	.80	.85	.50	.30	.18	.14	.20	......
24	.80	.80	.70	.80	.80	.80	.20	.20	.20	.14	.20	......
25	.80	.80	.70	.80	.80	.80	.10	.20	.20	.14	.20	......
26	.80	.80	.75	.80	.80	.80	.35	.20	.20	.13	.20	......
27	.80	.80	.85	.80	.80	.80	.20	.25	.20	.15	.20	......
28	.85	.85	.85	.80	.80	.80	.00	.20	.20	.18	.20	......
29	.80	......	.85	.80	1.15	.80	.30	.25	.20	.18	.20	......
30	.80	......	.80	.80	1.15	.80	.30	.20	.18	.18	.30	......
31	.80	......	.80	......	1.20	......	.40	.25	......	.18	......	......

a Maximum gage height 6.4 feet. b Maximum gage height 6.5 feet.

NOTE.—Gage heights affected by ice Jan. 1-14, Feb. 19-28, and Nov. 24 to Dec. 31, 1911.

CIMARRON RIVER AT UTE PARK, N. MEX.

Location.—At highway bridge in Ute Park in sec. 19, T. 27 N., R. 18 E., half a mile below mouth of Ute Creek.

Records available.—July 14, 1907, to December 31, 1911.

Drainage area.—235 square miles.

Gage.—Automatic recording gage installed in September, 1909; referred to the same datum as the staff gage previously used.

Channel.—Fairly permanent, but rough.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Very little backwater from ice during the winter months.

Diversions.—Little water is diverted above the station, but most of the normal flow is diverted below.

Accuracy.—Conditions are favorable for accurate results and the estimates of flow should be reliable.

Cooperation.—Station maintained in cooperation with the Territorial engineer of New Mexico.

Discharge measurements of Cimarron River at Ute Park, N. Mex., in 1911.

Data.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 7	Russell and Waha	0.65	50.1	June 8	G. H. Russell	0.50	26.0
7	do	.65	52.0	July 24	do	.60	45.7
May 6	G. H. Russell	.80	93.0				

Corrected daily gage height, in feet, of Cimarron River at Ute Park, N. Mex., for 1910.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		0.3	11		0.35	21	0.4	0.3
2		.4	12		.35	22	.4	.3
3		.45	13	0.45	.3	23	.4	.35
4		.5	14	.5	.3	24	.4	.35
5		.35	15	.5	.3	25	.4	.35
6		.35	16	.5	.3	26	.4	.35
7		.4	17	.5	.3	27	.35	.35
8		.4	18	.5	.3	28	.3	.35
9		.4	19	.4	.3	29	.3	.35
10		.4	20	.4	.3	30	.3	.35
						31		.35

NOTE.—Gage heights Nov. 13-Dec. 31, 1910, published in Water-Supply Paper 287 were found to be in error. The above values are correct. The change made in the daily discharges was so small, they are not republished. Gage height affected by ice Dec. 17-31, 1910.

Daily gage height, in feet, of Cimarron River at Ute Park, N. Mex., for 1911.

[Mrs. R. P. Woodard, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.35	0.60	0.24	0.63	0.77	0.80	0.42	0.48	0.45	0.48	0.53	0.44
2	.35	.55	.24	.63	.76	.75	.48	.45	.45	.42	.50	.42
3	.35	.55	.24	.66	.77	.70	.50	.48	.46	.38	.57	.40
4	.35	.42	.35	.66	.77	.68	.48	.48	.48	.40	.55	.38
5	.36	.55	.56	.62	.80	.62	.45	.45	.46	.75	.55	.38
6	.37	.53	[a].84	.60	.80	.56	.43	.45	.45	.62	.55	.40
7	.37	.55	.69	.62	.83	.57	.44	.45	.43	.65	.55	.40
8	.40	.58	.55	.62	.87	.52	.43	.45	.43	.62	.57	.42
9	.40	.64	.60	.62	.84	.50	.38	.43	.40	.58	.57	.45
10	.40	.63	.68	.62	.82	.42	.45	.43	.40	.57	.55	.45
11	.48	.58	.70	.58	.77	.42	.38	.43	.38	.57	.55	.44
12	.45	.55	.52	.60	.77	.42	.43	.45	.38	.58	.48	.42
13	.47	.57	.58	.58	.72	.40	.45	.43	.40	.55	.55	.42
14	.38	.53	.55	.59	.73	.38	.48	.43	.39	.55	.60	.41
15	.36	.53	.55	.58	.77	.35	.48	.43	.43	.52	.58	.48
16	.38	.58	.53	.62	.67	.35	.47	.43	.42	.50	.57	.53
17	.37	.58	.55	.65	.62	.35	.46	[c].62	.39	.51	.53	.54
18	.38	.40	.52	.65	.62	.42	.44	.45	.39	.49	.53	.50
19	.37	.27	.54	.64	.62	.38	.43	.45	.39	.49	.56	.50
20	.35	.27	.54	.63	.62	.37	.47	.47	.39	.49	.56	.52
21	.40	.27	.54	.65	.60	.46	.46	.55	.39	.53	.55	.50
22	.40	.27	.58	.70	.60	.43	.45	.60	.39	.57	.55	.50
23	.44	.27	.53	.80	.60	.38	.50	.50	.38	.58	.53	.45
24	.44	.27	.52	.80	.60	.40	[b].90	.40	.35	.59	.52	.47
25	.45	.24	.53	.84	.60	.37	.53	.42	.35	.58	.48	.47
26	.47	.24	.52	.82	.60	.37	.48	.50	.35	.58	.46	.50
27	.42	.24	.51	.85	.60	.40	.45	.50	.34	.60	.48	.48
28	.45	.24	.53	.84	.58	.42	.60	.50	.33	.58	.46	.50
29	.57	......	.55	.80	.66	.37	.55	.50	.38	.56	.48	.50
30	.60	......	.58	.77	.66	.38	.55	.50	.52	.56	.45	.45
31	.62	......	.62	......	.68	......	.48	.45	......	.55	......	.50

[a] Maximum gage height, 1.13 feet.
[b] Maximum gage height, 1.50 feet.
[c] Maximum gage height, 1.25 feet.

Daily discharge, in second-feet, of Cimarron River at Ute Park, N. Mex., for. 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.4	44	2.0	50	78	87	15	21	18	21	30	17
2	8.4	34	2.0	50	76	74	21	18	18	15	24	15
3	8.4	34	2.0	56	78	64	24	21	19	11	38	13
4	8.4	15	8.4	56	78	60	21	21	21	13	34	11
5	9.2	34	36	48	87	48	18	18	19	74	34	11
6	10	30	99	44	87	40	16	18	18	48	34	13
7	10	34	62	48	96	38	17	18	16	54	34	13
8	13	40	34	48	108	28	16	18	16	48	38	15
9	13	52	44	48	99	24	11	16	13	40	38	18
10	13	50	60	48	93	15	18	16	13	38	34	18
11	21	40	64	40	78	15	11	16	11	38	34	17
12	18	34	28	44	78	15	16	18	11	40	21	15
13	20	38	40	40	68	13	18	16	13	34	34	15
14	11	30	34	42	70	11	21	16	12	34	44	14
15	9.2	30	34	40	78	8.4	21	16	16	28	40	21
16	11	40	30	48	58	8.4	20	16	15	24	38	30
17	10	40	34	54	48	8.4	19	48	12	26	30	32
18	11	13	28	54	48	15	17	18	12	22	30	24
19	10	3.5	32	52	48	11	16	18	12	22	36	24
20	8.4	3.5	32	50	48	10	20	20	12	22	36	28
21	13	3.5	32	54	44	19	19	34	12	30	34	24
22	13	3.5	40	64	44	16	18	44	12	38	34	24
23	17	3.5	30	87	44	11	24	24	11	40	30	18
24	17	3.5	28	87	44	13	117	13	8.4	42	28	20
25	18	2.0	30	99	44	10	30	15	8.4	40	21	20
26	20	2.0	28	93	44	10	21	24	8.4	40	19	24
27	15	2.0	26	102	44	13	18	24	7.6	44	21	21
28	18	2.0	30	99	40	15	44	24	6.9	40	19	24
29	38	......	34	87	56	10	34	24	11	36	21	24
30	44	......	40	78	56	11	34	24	28	36	18	18
31	48	......	48	......	60	......	21	18	......	34	......	24

NOTE.—Daily discharge determined from a well-defined curve.

Monthly discharge of Cimarron River at Ute Park, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	48	8.4	15.9	978	A.
February	52	2.0	23.6	1,310	A.
March	99	2.0	34.6	2,130	A.
April	102	40	60.3	3,590	A.
May	108	40	65.2	4,010	A.
June	87	8.4	24.0	1,430	A.
July	117	11	23.7	1,460	A.
August	48	13	21.1	1,300	A.
September	28	6.9	13.7	815	A.
October	74	11	34.6	2,130	A.
November	44	18	30.9	1,840	A.
December	32	11	19.5	1,200	A.
The year	117	2.0	30.6	22,200	

RAYADO RIVER NEAR CIMARRON, N. MEX.

Location.—Just above the box canyon in sec. 23, T. 25 N., R. 17 E., 20 miles southwest of Cimarron. Nearest tributary, Agua Fria Creek, enters one-quarter mile above.

Records available.—May 8, 1911, to October 7, 1911, when the station was discontinued.

Drainage area.—Not measured.

Gage.—Vertical gage.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—No data.

Diversions.—No data.

Accuracy.—As the station has not been completely rated, no estimates of flow have been made.

Cooperation.—Station maintained in cooperation with the Territorial engineer of New Mexico. Gage heights are furnished through the courtesy of Mr. G. W. Webster, jr., Cimarron, N. Mex.

Discharge measurements of Rayado River near Cimarron, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 8	G. H. Russell	0.75	25.3
9	.....do	.73	24.6
June 10	.....do	.50	9.0

Daily gage height, in feet, of Rayado River near Cimarron, N. Mex., for 1911.

[Leon B. Ryan, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1		0.70	0.42	0.50	0.38		16		0.45	0.48	0.38	0.38	
2		.60	.42	.50	.36		17		.45	.48	.38	.35	
3		.60	.40	.48	.35		18		.50	.45	.54	.35	
4		.60	.40	.45	.45	0.45	19		.45	.45	.42	.32	
5		.55	.40	.42	.39	1.45	20		.48	.50	.38	.35	
6		.55	.58	.40	.36	1.30	21		.50	.60	.38	.32	
7		.55	.60	.40	.35	1.30	22	0.60	.50	.50	.43	.31	
8	0.75	.55	.52	.40	.35		23	.60	.45	.45	.51	.30	
9	.75	.55	.45	.40	.35		24	.55	.42	.60	.46	.30	
10		.52	.45	.40	.35		25	.55	.40	.55	.42		
11		.50	.45	.40	.32		26	.55	.40	.52	.40		
12		.50	.45	.40	.32		27	.50	.40	.50	.38		
13	.65	.50	.45	.38	.32		28	.50	.40	.50	.40		
14	.65	.50	.45	.38	.36		29	.52	.40	.78	.40		
15	.60	.45	.45	.38	.41		30	.55	.40	.55	.40		
							31	.68		.52	.38		

RAYADO RIVER NEAR ABREU'S RANCH, NEAR CIMARRON, N. MEX.

Location.—Six miles above Abreu's ranch house, at the mouth of the box canyon 15 miles southeast of Cimarron near sec. 29, T. 25 N., R. 18 E.

Records available.—May 4, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Automatic recording gage, installed May 5, 1911. A staff gage, located three-quarters of a mile above Abreu's ranch house, was read until May 5, 1911, when the station was moved to its present site. No determined relation between the two gages. No streams enter between the two points, but it is possible that some of the flow is lost by sinking into the sand.

Channel.—Slightly shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes some backwater during the winter months.

Diversions.—No water is diverted above the station, and the records represent the natural run-off.

Cooperation.—Prior to October, 1909, stations in the Rayado River basin were maintained by the New Mexico Hydrographic Survey, but since that time they have been maintained by the United States Geological Survey in cooperation with the Territorial engineer of New Mexico.

Discharge measurements of Rayado River near Abreu's ranch, near Cimarron, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 6	G. H. Russell	[a] 1.50	11.0	June 9	G. H. Russell	1.01	9.2
May 4	do	1.10	17.1	July 26	do	1.01	9.5
4	do	1.10	16.1	Nov. 15	W. B. Freeman	1.01	10.3
9	do	1.32	25.0				

[a] Gage height to the old gage datum.

Daily gage height, in feet, of Rayado River near Abreu's ranch, near Cimarron, N. Mex., for 1911.

[C. H. Coulter, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	1.25	0.90	0.95	0.75	0.86	1.05	1.05
2	....	1.15	.90	.95	.80	.80	1.10	1.00
3	....	1.15	.85	.90	.80	.75	1.05	.90
4	1.10	1.15	.85	.90	.90	.85	.85	.70
5	1.20	1.07	.80	.90	.80	2.17	.80	.65
6	1.25	1.07	.95	.85	.75	1.66	.90	.65
7	1.30	1.07	1.05	.85	.75	1.47	.93	.60
8	1.35	1.07	.90	.90	.75	1.38	.94	.60
9	1.35	1.00	.90	.90	.75	1.32	.93	.80
10	1.30	.98	.85	.85	.75	1.28	.94	.80
11	1.30	.95	.85	.85	.75	1.23	.95	.80
12	1.25	.95	.90	.80	.75	1.18	1.00	.80
13	1.25	.95	.90	.80	.75	1.14	1.13	.80
14	1.35	.90	.90	.80	.75	1.10	1.17	.80
15	1.40	.90	.95	.80	.88	1.06	.98	.80
16	1.30	.90	.95	.80	.78	1.03	.98	.78
17	1.30	.90	.95	.80	.72	1.02	1.00	.78
18	1.25	.95	.90	.85	.72	1.00	1.00	.78
19	1.20	.90	.95	.90	.72	1.00	.95	.78
20	1.10	.95	1.00	.90	.74	.99	.98	.78
21	1.10	1.05	1.05	.95	.73	1.05	.97	.78
22	1.10	1.05	.95	.95	.71	1.08	.95	.78
23	1.10	1.00	.95	.85	.70	1.08	.97	.78
24	1.07	.85	1.15	.85	.70	1.05	.98	.78
25	1.07	.90	1.05	.85	.70	1.03	1.05	.78
26	1.07	.80	1.00	.90	.70	1.05	1.03	.78
27	1.02	.80	.95	.80	.70	1.05	1.02	.78
28	1.02	.80	1.00	.90	.70	1.08	1.02	.78
29	1.02	.80	1.15	.85	.98	1.13	1.04	.78
30	1.07	.80	1.10	.80	1.06	1.12	1.12	.78
31	1.25	....	1.60	.80	....	1.09	....	.78

NOTE.—Gage heights May 17 to June 9 estimated from a hydrograph. Gage heights Nov. 25 to Dec. 31 affected by ice.

Daily discharge, in second-feet, of Rayado River near Abreu's ranch, near Cimarron, N. Mex., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	21	6.5	7.9	3.3	5.6	11
2	....	16	6.5	7.9	4.2	4.2	13
3	....	16	5.4	6.5	4.2	3.3	11
4	16	16	5.4	6.5	6.5	5.4	5.4
5	20	12	4.2	6.5	4.2	111	4.2
6	23	12	7.9	5.4	3.3	53	6.5
7	26	12	11	5.4	3.3	36	7.3
8	28	12	6.5	6.5	3.3	29	7.6
9	27	9.3	6.5	6.5	3.3	25	7.3
10	24	8.7	5.4	5.4	3.3	23	7.6
11	24	7.9	5.4	5.4	3.3	20	7.9
12	21	7.9	6.5	4.2	3.3	17	9.3
13	21	7.9	6.5	4.2	3.3	15	14
14	27	6.5	6.5	4.2	3.3	13	16
15	30	6.5	7.9	4.2	6.0	12	8.7
16	24	6.5	7.9	4.2	3.8	10	8.7
17	24	6.5	7.9	4.2	2.8	10	9.3
18	21	7.9	6.5	5.4	2.8	9.3	9.3
19	18	6.5	7.9	6.5	2.8	9.3	7.9
20	13	7.9	9.3	6.5	3.1	9.0	8.7
21	13	11	11	7.9	2.9	11	8.5
22	13	11	7.9	7.9	2.6	12	7.9
23	13	9.3	7.9	5.4	2.4	12	8.5
24	12	5.4	16	5.4	2.4	11	8.7
25	12	4.2	11	5.4	2.4	10	....
26	12	4.2	9.3	4.2	2.4	11	....
27	10	4.2	7.9	4.2	2.4	11	....
28	10	4.2	9.3	6.5	2.4	12	....
29	10	4.2	16	5.4	8.7	14	....
30	12	4.2	13	4.2	12	14	....
31	21	....	9.3	4.2	....	13	....

NOTE.—Daily discharge determined as follows: May 4-9 by the indirect method for shifting channels, May 10 to Nov. 24 from a well-defined curve, Nov. 25 to Dec. 31 estimated on account of ice.

Monthly discharge of Rayado River near Abreu's ranch near Cimarron, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 4-31	30	10	18.7	1,040	A.
June	21	4.2	8.96	533	A.
July	16	4.2	8.26	508	A.
August	7.9	4.2	5.62	346	A.
September	12	2.4	3.80	226	A.
October	111	3.3	17.8	1,090	B.
November	16	....	7.94	472	B.
December	....	....	2.0	123	C.
The period	....	....	....	4,340	

NOTE.—Discharge estimated at 4 second-feet Nov. 25-30 and at 2 second-feet Dec. 1-31, 1911, on account of ice.

MORA RIVER AND LA CUEVA CANAL AT LA CUEVA, N. MEX.

Location.—At highway bridge at La Cueva, a few miles above the mouth of the Cebolla and a short distance downstream from the intake of the La Cueva canal, and just below wasteway, about sec. 24, T. 20 N., R. 16 E.

Records available.—August 25, 1903, to July 31, 1911, when the station was discontinued.

Drainage area.—Not measured.

Gage.—The original gage was washed out by a flood on September 29, 1904. A new staff gage, referred to a datum 1.32 feet above that of the original gage, was installed April 29, 1905, and has remained unchanged since that date. The canal gage is at a footbridge below the wasteway; its datum has remained constant.

Channel.—Somewhat shifting, both in the river and the canal.

Discharge measurements.—Made from the bridge during high water and by wading during low water.

Winter flow.—Ice causes slight backwater for a few days during the winter months.

Diversions.—Above the station only a little water is diverted so that the combined flow of the river and canal represent closely the natural run-off from the drainage area.

Accuracy.—Owing to the somewhat shifting channel and insufficient measurements, the estimates of flow can not be considered better than fair.

Cooperation.—Station maintained in cooperation with the Territorial engineer of New Mexico.

Discharge measurements of Mora River at La Cueva, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
May 9	R. L. Cooper	1.30	36.1
June 13	G. H. Russell	.86	9.3

Daily gage height, in feet, of Mora River at La Cueva, N. Mex., for 1911.

[Hugh Louden, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	....	0.85	0.80	0.65	0.75	1.80	1.00
2	....	.85	.80	.65	.75	2.10	1.10
3	....	.80	.50	.75	.70	1.85	1.70
4	....	.80	.85	.75	.70	1.80	1.50
5	....	.80	.70	.80	.75	1.60	1.50
6	....	.85	.85	.65	....	1.40	1.70
7	....	.75	.90	.60	1.30	1.40	2.00
8	....	.80	.95	.80	1.70	1.35	....
9	....	.80	.90	.70	1.30	1.15	1.55
10	....	.80	1.00	.80	1.20	1.05	1.60
11	0.80	.60	1.00	.80	.95	1.25	1.90
12	.55	.50	1.00	.70	.90	1.00	1.55
13	.50	.70	.95	.70	1.55	.90	a 2.75
14	.50	.60	.95	.70	2.35	.70	2.00
15	.50	.70	.95	.70	2.25	.75	2.20
16	.50	.80	1.00	.70	2.15	.60	2.20
17	.45	.60	.90	.70	1.90	.60	2.32
18	.45	.60	.95	.70	1.65	2.28	2.00
19	.80	.70	.95	.70	1.65	1.40	1.95
20	.45	.80	.95	.75	1.65	1.35	2.00
21	.45	1.10	.95	.60	1.70	1.60	b 3.30
22	.45	....	.85	.60	1.45	1.45	2.00
23	.45	....	.80	.65	1.35	1.25	3.88
24	.45	....	.70	.80	1.20	1.15	4.15
25	.50	....	.80	1.00	....	1.15	3.15
26	.50	....	1.00	.80	1.30	.90	2.90
27	.45	....	.65	.60	1.40	.55	2.60
28	.45	....	.65	.60	1.50	.60	2.50
29	.85	....	.85	.75	1.60	.75	2.70
30	.85	....	.55	.80	1.70	.60	2.40
31	.50	....	.65	....	1.60	....	2.10

a Maximum gage height 3.6 feet. b Maximum gage height 3.8 feet.

NOTE.—Gage heights affected by ice Jan. 1 to 10 and Feb. 22 to 28.

Daily discharge, in second-feet, of Mora River at La Cueva, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	....	9.0	7.0	3.2	5.5	90	16
2	....	9.0	7.0	3.2	5.5	126	22
3	....	7.0	1.5	5.5	4.0	96	78
4	....	7.0	9.0	5.5	4.0	90	55
5	....	7.0	4.0	7.0	5.5	66	55
6	....	9.0	9.0	3.2	21	45	78
7	....	5.5	11	2.5	36	45	114
8	....	7.0	14	7.0	78	40	87
9	....	7.0	11	4.0	36	26	60
10	....	7.0	16	7.0	29	19	66
11	7.0	2.5	16	7.0	14	32	102
12	2.0	1.5	16	4.0	11	16	60
13	1.5	4.0	14	4.0	60	11	210
14	1.5	2.5	14	4.0	158	4.0	114
15	1.5	4.0	14	4.0	146	5.5	139
16	1.5	7.0	16	4.0	132	2.5	139
17	1.0	2.5	11	4.0	102	2.5	155
18	1.0	2.5	14	4.0	72	149	114
19	7.0	4.0	14	4.0	72	45	108
20	1.0	7.0	14	5.5	72	40	114
21	1.0	22	14	2.5	78	66	282
22	1.0	....	9.0	2.5	50	50	114
23	1.0	....	7.0	3.2	40	32	358
24	1.0	....	4.0	7.0	29	26	406
25	1.5	....	7.0	16	32	26	262
26	1.5	....	16	7.0	36	11	230
27	1.0	....	3.2	2.5	45	2.0	191
28	1.0	....	3.2	2.5	55	2.5	178
29	9.0	....	9.0	5.5	66	5.5	204
30	9.0	....	2.0	7.0	78	2.5	165
31	1.5	....	3.2	....	66	....	126

NOTE.—Daily discharge determined from a curve not well defined. Discharge interpolated May 6, 25, and July 8.

Monthly discharge of Mora River at La Cueva, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	9.0	....	2.05	126	C.
February	22	1.5	6.04	335	C.
March	16	1.5	10.0	615	B.
April	16	2.5	4.94	294	B.
May	158	4.0	52.9	3,250	C.
June	149	2.0	39.1	2,330	B.
July	406	16	142	8,730	C.
The period	....	....	....	15,700	

NOTE.—Discharge estimated at 1 second-foot Jan. 1-10 and at 5 second-feet Feb. 22-28 on account of ice.

Discharge measurements of La Cueva canal at La Cueva, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 9	R. L. Cooper	[a]0.10	4.8
June 12	G. H. Russell	[a].80	13.0

[a] The gage height taken during measurement was distorted. This gage height was taken by the observer in the evening.

Daily gage height, in feet, of La Cueva canal at La Cueva, N. Mex., for 1911.

[Hugh Louden, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May	June	July.
1	....	0.05	....	0.7	0.75	0.8	0.3
2	....	.05	0.1	.9	.8	.9	1.2
3	....	.05	.6	1.0	.7	.8	1.1
4	....	.1	.2	.9	.6	.8	1.2
5	....	.05	.6	.8	.8	.8	1.0
6	....	....	.2	.85	....	.7	1.0
7	....	.1	.2	.6	1.05	.7	.5
8	....	....	.05	.7	....	.7	....
9	....	....	.1	.9	.75	.7	1.05
10	....	....	.05	.6	.85	.65	1.1
11	....	.3	.05	.5	.8	1.0	1.0
12	0.5	.5	.05	.6	.75	.55	1.15
13	.55	.3	.2	.65	.1	.8	.95
14	.5	.4	.05	.6	....	.85	.85
15	.5	.3	.05	.6	....	.9	1.0
16	.55	....	.05	.7	....	.85	1.0
17	.6	.5	.05	.5	.7	.9	1.1
18	.55	.6	.05	.5	.6	.8	1.05
19	....	.5	.05	.5	.4	.9	.5
20	.4	.2	.05	.2	.3	1.1	.2
21	.55	....	.05	.45	.65	1.1	....
22	.55	....	.4	.6	.4	1.1	....
23	.5	....	.55	.8	.3	1.15	.6
24	.55	....	.55	.8	.55	1.1	....
25	.6	....	.5	.6	....	1.15	....
26	.6	....	.1	.75	.6	.9	....
27	.55	....	.8	.6	.9	1.0	....
28	.5	....	.9	.8	.9	.6	....
29	.05	....	.7	.8	.8	.5	1.1
30	.05	....	.9	.95	.8	.7	1.05
31	.55	....	.85	....	.8	....	1.1

NOTE.—No water flowing in the canal on days for which gage heights are missing from Jan. 1 to July 31, except May 6, 25, and July 8, when gage was not read.

Daily discharge, in second-feet, of La Cueva canal at La Cueva, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	0.0	4.6	0.0	11.3	12.2	13.0	6.3
2	.0	4.6	4.8	14.9	13.0	14.9	21.5
3	.0	4.6	9.8	17.0	11.3	13.0	19.2
4	.0	4.8	5.5	14.9	9.8	13.0	21.5
5	.0	4.6	9.8	13.0	13.0	13.0	17.0
6	.0	.0	5.5	14.0	15.6	11.3	17.0
7	.0	4.8	5.5	9.8	18.1	11.3	8.5
8	.0	.0	4.6	11.3	.0	11.3	13.3
9	.0	.0	4.8	14.9	12.2	11.3	18.1
10	.0	.0	4.6	9.8	14.0	10.6	19.2
11	.0	6.3	4.6	8.5	13.0	17.0	17.0
12	8.5	8.5	4.6	9.8	12.2	9.2	20.4
13	9.2	6.3	5.5	10.6	4.8	13.0	16.0
14	8.5	7.3	4.6	9.8	.0	14.0	14.0
15	8.5	6.3	4.6	9.8	.0	14.9	17.0
16	9.2	.0	4.6	11.3	.0	14.0	17.0
17	9.8	8.5	4.6	8.5	11.3	14.9	19.2
18	9.2	9.8	4.6	8.5	9.8	13.0	18.1
19	.0	8.5	4.6	8.5	7.3	14.9	8.5
20	7.3	5.5	4.6	5.5	6.3	19.2	5.5
21	9.2	.0	4.6	7.9	10.6	19.2	.0
22	9.2	.0	7.3	9.8	7.3	19.2	.0
23	8.5	.0	9.2	13.0	6.3	20.4	9.8
24	9.2	.0	9.2	13.0	9.2	19.2	.0
25	9.8	.0	8.5	9.8	9.5	20.4	.0
26	9.8	.0	4.8	12.2	9.8	14.9	.0
27	9.2	.0	13.0	9.8	14.9	17.0	.0
28	8.5	.0	14.9	13.0	14.9	9.8	.0
29	4.6	....	11.3	13.0	13.0	8.5	19.2
30	4.6	....	14.9	16.0	13.0	11.3	18.1
31	9.2	....	14.0	....	13.0	....	19.2

NOTE.—Daily discharge determined from a rating curve not well defined. Discharge interpolated May 6, 25, and July 8.

Monthly discharge of La Cueva canal at La Cueva, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	9.8	0.0	5.23	322	B.
February	9.8	.0	3.39	188	C.
March	14.9	.0	6.89	424	B.
April	17.0	5.5	11.3	672	B.
May	18.1	.0	9.85	606	B.
June	20.4	8.5	14.2	845	B.
July	21.5	.0	12.3	756	B.
The period				3,810	

SAPELLO RIVER AT LOS ALAMOS, N. MEX.

Location.—At Los Alamos post office near sec. 28, T. 18 N., R. 16 E. No important tributary enters between this station and the mouth, a few miles east.

Records available.—August 22, 1903, to May 31, 1911, when the station was discontinued.

Drainage area.—144 square miles.

Gage.—A chain gage installed in April, 1905, to replace the original gage which was destroyed by flood September 29, 1904.

Channel.—Somewhat shifting.

Discharge measurements.—Made from car and cable during high water and by wading at ordinary stages.

Winter flow.—There is very little backwater from ice during the winter period.

Diversions.—A considerable part of the normal flow is diverted for irrigation above the station.

Accuracy.—Owing to the shifting channel and insufficient measurements, the estimates of flow can not be considered better than fair.

Cooperation.—Station maintained in cooperation with the Territorial engineer of New Mexico.

The following discharge measurement was made by R. L. Cooper: May 10, 1911, gage height, −0.04 foot; discharge, 1.3 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of Sapello River at Los Alamos, N. Mex., for 1911.

[William Frank, observer.]

Day.	Jan.		Feb.		Mar.		Apr.		May.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	....	....	−0.10	1.5	−0.10	1.5	0.05	4.9	0.00	3.5
2	....	....	− .10	1.5	− .05	2.5	.05	4.9	.00	3.5
3	....	....	− .10	1.5	.00	3.5	.05	4.9	.00	3.5
4	....	....	− .10	1.5	.10	6.3	.05	4.9	−.10	1.5
5	....	....	− .05	2.5	.10	6.3	.05	4.9	−.10	1.5
6	....	....	.00	3.5	.15	8.2	.05	4.9	−.10	1.5
7	....	....	.00	3.5	.10	6.3	.05	4.9	.00	3.5
8	....	....	− .05	2.5	.10	6.3	.05	4.9	−.10	1.5
9	−0.10	1.5	− .05	2.5	.10	6.3	.20	10	−.10	1.5
10	− .10	1.5	− .10	1.5	.05	4.9	.20	10	−.05	2.5
11	− .10	1.5	− .10	1.5	.05	4.9	.20	10	−.05	2.5
12	− .10	1.5	− .10	1.5	.05	4.9	.20	10	.00	3.5
13	− .10	1.5	− .05	2.5	.05	4.9	.20	10	.00	3.5
14	− .10	1.5	.00	3.5	.05	4.9	.20	10	.75	46
15	− .10	1.5	− .10	1.5	.05	4.9	.20	10	.85	54
16	− .10	1.5	− .10	1.5	.05	4.9	.20	10	.65	37
17	− .10	1.5	− .10	1.5	.05	4.9	.20	10	.55	30
18	− .10	1.5	− .10	1.5	.05	4.9	.20	10	.50	26
19	− .10	1.5	....	1.5	.05	4.9	.20	10	.50	26
20	− .10	1.5	....	2.0	.05	4.9	.10	6.3	.40	20
21	− .10	1.5	.00	3.5	.05	4.9	.00	3.5	.40	20
22	− .10	1.5	.00	3.5	.05	4.9	.10	6.3	.35	18
23	− .10	1.5	.00	3.5	.05	4.9	− .10	1.5	.25	12
24	− .10	1.5	− .05	2.5	.08	5.7	− .10	1.5	.10	6.3
25	− .10	1.5	− .05	2.5	.08	5.7	.00	3.5	.00	3.5
26	− .10	1.5	− .05	2.5	.05	4.9	.05	4.9	.00	3.5
27	− .10	1.5	− .05	2.5	.05	4.9	.20	10	.00	3.5
28	− .10	1.5	.00	3.5	.05	4.9	.20	10	.30	15
29	− .10	1.5	....	....	.05	4.9	.10	6.3	.50	26
30	− .10	1.5	....	....	.05	4.9	− .10	1.5	.50	26
31	− .10	1.5	....	....	.05	4.9	....	....	.60	33

NOTE.—Gage heights affected by ice Jan. 1 to 8, Feb. 19 and 20, 1911. Daily discharge determined from a rating curve not well defined. Discharge Feb. 19 and 20 estimated on account of ice.

Monthly discharge of Sapello River at Los Alamos, N. Mex., for 1911.

Month.	Discharge, in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1.5	....	1.37	84	C.
February	3.5	1.5	2.30	128	C.
March	8.2	1.5	5.05	311	C.
April	10	1.5	6.82	406	C.
May	54	1.5	14.2	873	B.

NOTE.—Discharge estimated at 1 second-foot Jan. 1–8, 1911.

PAJARITO CREEK NEAR HANLEY, N. MEX.

Location.—In sec. 26, T. 11 N., R. 28 E., 2 miles north of Hanley, a quarter of a mile above mouth of Vigil Creek, the nearest tributary.

Records available.—August 30, 1911, to December 31, 1911.

Drainage area.—310 square miles.

Gage.—Automatic recording gage.

Channel.—Data too meager to determine.

Discharge measurements.—Made by floats during high water and by wading at ordinary stages.

Winter flow.—No data.

Diversions.—No water is diverted above the station, and therefore the records represent the natural run-off.

Accuracy.—Owing to the possibility of shift and the fact that the upper portion of the rating curve is determined by floats and slope measurements, no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the Territorial engineer of New Mexico. The gage heights are furnished through the courtesy of Mr. V. W. Moore, Tucumcari, N. Mex.

Discharge measurements of Pajarito Creek near Hanley, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Aug. 27	G. H. Russell	11.50	[a]4,520	Aug. 28	G. H. Russell	1.60	136
27	.....do	8.00	[a]2,280	30	.....do	.87	[b]3.0
27	.....do	5.00	[a]882	30	.....do	.50	0
28	.....do	2.70	374	Nov. 10	W. B. Freeman	.65	0

[a] Estimated from Kutter's formula.

[b] Estimated.

Daily gage height, in feet, of Pajarito Creek near Hanley, N. Mex., for 1911.

[V. W. Moore, observer.]

Aug. 27	8.15	Sept. 12	2.10
28	2.15	13	1.60
30	.87	14	1.20
31	.87	15	.90
Sept. 9	[1] 2.50	16	.80
10	1.10	17	.70
11	1.50	Oct. 31	1.20

NOTE.—No flow in creek on dates from Aug. 26 to Dec. 31, for which time gage heights are not published. The total discharge of floods in June is estimated as 300 acre-feet and in July 1,600 acre-feet. The discharge of flood on Aug. 23 is estimated as 2,000 acre-feet and on Aug. 28 as 2,400 acre-feet.

UTE CREEK NEAR LOGAN, N. MEX.

Location.—Four miles above the mouth of Ute Creek in the northeastern corner of T. 13 N., R. 32 E. No important tributaries enter within several miles of the station.

Records available.—August 12, 1904, to June 30, 1906; April 13, 1909, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Automatic recording gage installed August 1, 1911, to replace original staff gage used since 1904. Datum of recording gage different from that of staff gage.

Channel.—Very shifting.

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[1] Maximum gage height 4.55 feet.

Discharge measurements.—Made by wading at ordinary stages. Estimates of flood discharge are made by slope measurements and the use of Kutter's formula.

Winter flow.—Little backwater from ice during the winter months.

Diversions.—A small amount of water is diverted above the station for irrigation.

Accuracy.—Owing to the shifting nature of the stream bed, the records can be considered only fair. The finding of an error in obtaining the cross section of the stream necessitated the revision of the back data which are published in this report.

Cooperation.—During 1911 the station was maintained in cooperation with the Territorial engineer of New Mexico.

Discharge measurements of Ute Creek near Logan, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 17	C. B. Digby		(a)	Aug. 1	E. O. Christiansen	0.70	[b] 1.0
Apr. 5	G. H. Russell		0	26	G. H. Russell	[c] 1.85	201
May 21	R. L. Cooper	0.70	[b] .5	Nov. 8	W. B. Freeman	[c] .57	[b] .2
July 30	E. O. Christiansen	1.30	15.8				

[a] Very slight flow. [b] Estimated. [c] Gage height from automatic gage at new datum.

Daily gage height, in feet, of Ute Creek near Logan, N. Mex., for 1911.

[Samuel Ruff, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	1.35	0.45	0.85	0.90	0.90	0.60	0.78
2	....	1.20	1.10	.80	.70	.70	.60	.83
3	....	1.20	1.00	.85	....	.60	.60	.82
4	....	....	.50	.75	.80	.80	.60	.80
5	....	.90	.40	.70	.80	.90	.60	.78
6	....	.80	.60	....	.80	.65	.60	.72
7	....	.70	1.70	.70	.80	.60	.55	.65
8	....	.65	.60	.65	.80	.60	.55	.65
9	....	.60	1.20	.65	[a] 3.00	.55	.55	.65
10	....	.60	.50	.35	2.40	.55	.55	.65
11	....	....	3.00	.85	1.70	.55	.50	.65
12	....	.60	2.50	.30	1.00	.55	.45	.65
13	....	.60	2.80	....	.60	.55	.45	.67
14	....	.60	1.40	.20	.60	.55	.45	.67
15	....	.55	1.10	.25	.60	.50	.45	.68
16	6.00	.55	1.00	.30	.60	.50	.40	.68
17	....	.55	.80	.20	.90	.50	.40	.69
18	....	1.30	1.10	.20	.85	.50	.40	.70
19	....	.55	1.50	.10	.70	.50	.40	.70
20	....	.60	3.50	....	.65	.50	.40	.70
21	.70	.60	2.80	.10	.55	.50	.40	.70
22	.75	.65	5.80	.30	.50	.50	.40	.70
23	.65	.50	1.50	3.00	.50	.50	.40	.70
24	.65	.40	1.60	2.00	.50	.50	.40	.70
25	.65	....	1.20	4.00	.50	.50	.50	.70
26	.65	.40	1.10	1.85	.50	.50	.60	.70
27	.65	.70	1.10	....	.50	.50	.65	.70
28	4.00	.55	1.50	2.00	.50	.50	....	.70
29	3.60	.50	1.30	1.20	.50	.95	.70	.70
30	3.25	.50	1.30	1.10	1.10	.75	.70	.70
31	1.60	....	.95	1.00	....	.60	....	.70

[a] Maximum gage height, 4.3 feet.

NOTE.—No flow in the creek on days for which gage heights are omitted except the middle of February, when there was slight flow. Gage heights after Aug. 1, 1911, refer to automatic gage at new datum.

Daily discharge, in second-feet, of Ute Creek near Logan, N. Mex., for 1904–1906, 1909–1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
1	......	......	......	......	......	......	......	......	0	700	0.0	0.0
2	......	......	......	......	......	......	......	......	19,000	500	.0	.0
3	......	......	......	......	......	......	......	......	6,400	310	.0	.0
4	......	......	......	......	......	......	......	......	1,950	166	.0	.0
5	......	......	......	......	......	......	......	......	310	92	.0	.0
6	......	......	......	......	......	......	......	......	54	39	.0	.0
7	......	......	......	......	......	......	......	......	18	18	.0	.2
8	......	......	......	......	......	......	......	......	4	4	.0	.2
9	......	......	......	......	......	......	......	......	1.5	39	.0	.2
10	......	......	......	......	......	......	......	......	.0	26	.0	.2
11	......	......	......	......	......	......	......	......	.2	26	.0	.2
12	......	......	......	......	......	......	......	......	1.5	18	.0	.0
13	......	......	......	......	......	......	......	......	1.5	11	.0	.0
14	......	......	......	......	......	......	......	0.2	1.5	4	.0	.0
15	......	......	......	......	......	......	......	.2	1.5	.2	.0	.0
16	......	......	......	......	......	......	......	.2	1.5	.2	.0	.0
17	......	......	......	......	......	......	......	6,400	1.5	.2	.0	.0
18	......	......	......	......	......	......	......	500	1.5	.2	.0	.0
19	......	......	......	......	......	......	......	400	.2	.2	.0	.0
20	......	......	......	......	......	......	......	92	.2	.0	.0	.0
21	......	......	......	......	......	......	......	72	.2	.0	.0	.0
22	......	......	......	......	......	......	......	54	.2	.0	.0	.0
23	......	......	......	......	......	......	......	39	.2	.0	.0	.0
24	......	......	......	......	......	......	......	26	.2	.0	.0	.0
25	......	......	......	......	......	......	......	18	.0	.0	.0	.0
26	......	......	......	......	......	......	......	11	.0	.0	.0	.0
27	......	......	......	......	......	......	......	7	.0	.0	.0	.0
28	......	......	......	......	......	......	......	0	1,950	.0	.0	.0
29	......	......	......	......	......	......	......	0	5,100	.0	.0	.0
30	......	......	......	......	......	......	......	0	1,250	.0	.0	.0
31	......	......	......	......	......	......	......	0	......	.0	.0	.0
1905.												
1	0.2	0.2	17.7	7.0	17.7	72	352	4,300	2	2	0	31
2	.2	.2	17.7	2,400	7.0	26	70	4,100	2	2	0	19
3	.0	.2	17.7	1,090	3.9	7.0	70	3,400	2	2	0	19
4	.0	.2	17.7	420	1.5	7.0	38	900	2	2	0	11
5	.0	.2	7.0	234	.2	7.0	27	19	550	0	0	5
6	.0	.2	17.7	166	.2	17.7	190	46	186	0	0	5
7	.0	.2	17.7	114	.2	17.7	14	186	900	0	0	2
8	.0	.2	7.0	72	.2	17.7	14	1,350	450	0	31	0
9	.0	.2	7.0	54	.2	17.7	14	550	84	0	300	0
10	.0	.2	7.0	26	.2	26	14	186	155	0	136	0
11	.2	.2	1.5	26	.2	26	10	65	155	0	84	0
12	.2	.2	26	26	.0	17.7	10	11	105	0	155	0
13	1.5	.2	26	26	.0	7.0	10	11	19	0	155	65
14	1.5	.2	26	17.7	.0	3.9	7	5	5	0	186	31
15	1.5	1.5	26	17.7	.0	.2	7	19	2	0	186	31
16	1.5	1.5	17.7	1.5	.0	.0	7	5	46	0	105	31
17	1.5	1.5	17.7	1.5	.0	.0	7	2	19	0	19	31
18	1.5	.2	17.7	1.5	.0	.0	7	0	19	0	5	31
19	3.9	.2	1.5	1.5	.0	.0	7	0	5	0	5	31
20	3.9	17.7	1.5	.2	166	.0	7	0	0	0	5	31
21	3.9	54	33.9	1.5	26	1.5	38	0	0	0	5	31
22	3.9	26	7.9	1.5	17.7	.2	162	0	0	0	11	19
23	3.9	26	7.0	1,900	18,000	.0	70	0	0	0	750	11
24	3.9	166	7.0	2,400	5,700	.0	38	0	0	0	105	11
25	3.9	114	7.0	1,600	2,600	.0	38	0	0	0	46	11
26	1.5	54	7.0	680	18,000	.0	27	0	5	0	46	11
27	1.5	26	3.9	375	2,600	.0	27	0	5	0	46	11
28	1.5	26	1.5	139	420	.0	14	2	2	0	46	11
29	1.5	......	.2	39	272	3.9	10	5	2	0	46	5
30	.2	......	.2	26	198	150	5,000	5	2	0	31	5
31	.2	......	.2	......	139	......	4,800	2	......	0	......	5

Daily discharge, in second-feet, of Ute Creek near Logan, N. Mex., for 1904–1906, 1909–1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.												
1	5	5	2	0	2	2	......	......	......	......	......	......
2	5	5	0	0	0	0	......	......	......	......	......	......
3	5	5	0	0	0	3,200	......	......	......	......	......	......
4	11	5	0	0	0	300	......	......	......	......	......	......
5	11	5	0	2	0	186	......	......	......	......	......	......
6	11	5	0	2	0	11	......	......	......	......	......	......
7	11	5	0	2	0	11	......	......	......	......	......	......
8	11	5	0	2	0	5	......	......	......	......	......	......
9	11	5	0	2	0	2	......	......	......	......	......	......
10	11	5	0	2	0	2	......	......	......	......	......	......
11	19	5	0	0	0	2	......	......	......	......	......	......
12	31	19	0	0	19	2	......	......	......	......	......	......
13	31	19	0	0	19	2	......	......	......	......	......	......
14	31	11	0	0	11	0	......	......	......	......	......	......
15	31	11	0	0	5	0	......	......	......	......	......	......
16	31	5	0	0	5	0	......	......	......	......	......	......
17	31	5	0	0	2	0	......	......	......	......	......	......
18	19	5	0	0	0	0	......	......	......	......	......	......
19	19	5	0	65	0	0	......	......	......	......	......	......
20	11	5	0	31	0	0	......	......	......	......	......	......
21	11	2	0	31	0	0	......	......	......	......	......	......
22	11	2	0	31	74	0	......	......	......	......	......	......
23	5	2	0	11	300	0	......	......	......	......	......	......
24	5	2	0	11	186	0	......	......	......	......	......	......
25	5	2	0	2	11	0	......	......	......	......	......	......
26	5	2	0	2	5	0	......	......	......	......	......	......
27	5	2	0	2	5	0	......	......	......	......	......	......
28	5	2	0	2	5	0	......	......	......	......	......	......
29	5	......	0	2	5	0	......	......	......	......	......	......
30	5	......	0	2	2	0	......	......	......	......	......	......
31	5	......	0	......	2	......	......	......	......	......	......	......
1909.												
1	......	......	......	......	.0	0	0	0	0	0	0	4
2	......	......	......	......	.0	0	0	0	0	0	0	6
3	......	......	......	......	.0	0	0	0	0	196	0	8
4	......	......	......	......	.0	0	0	0	0	232	0	13
5	......	......	......	......	.0	0	0	0	0	310	0	8
6	......	......	......	......	.0	0	0	0	12,500	310	0	8
7	......	......	......	......	.0	0	0	0	2,070	310	0	8
8	......	......	......	......	.0	0	0	0	490	232	0	8
9	......	......	......	......	.0	0	0	1,000	196	196	0	8
10	......	......	......	......	.0	0	0	164	67	21	0	8
11	......	......	......	......	.0	0	0	110	27	10	0	8
12	......	......	......	......	.0	0	0	110	33	1.1	0	8
13	......	......	......	......	.0	0	0	164	17	.0	0	8
14	......	......	......	......	.0	0	0	6.2	4.5	.0	0	8
15	......	......	......	......	.0	420	0	.0	33	.0	0	8
16	......	......	......	......	.0	360	0	33	88	.0	0	8
17	......	......	......	......	.0	164	0	78	58	210	0	8
18	......	......	......	......	.0	1.1	0	1,260	21	132	0	8
19	......	......	......	......	.0	.0	0	310	17	19	0	5
20	......	......	......	......	.0	.0	0	164	1.1	11	0	5
21	......	......	......	......	6.2	.0	0	150	.0	10	0	2
22	......	......	......	......	1.1	.0	0	41	.0	1	0	2
23	......	......	......	......	.0	.0	0	33	.0	0	0	2
24	......	......	......	......	67	8.0	0	78	.0	0	0	2
25	......	......	......	......	6.2	290	0	8	.0	0	0	2
26	......	......	......	......	.0	1,330	0	1.1	.0	0	0	2
27	......	......	......	......	.0	67	0	.0	.0	0	0	2
28	......	......	......	......	.0	196	0	.0	.0	0	0	1
29	......	......	......	......	.0	232	0	.0	.0	0	0	1
30	......	......	......	......	.0	560	0	.0	.0	0	2	1
31	......	......	......	......	.0	......	0	.0	......	0	......	1
1910.												
1	2	.2	.1	0	0	0	21	850	0	0	0	0
2	3	.2	.1	0	0	0	13	1,600	0	0	0	0
3	3	.2	.1	0	0	0	136	590	6	0	0	0
4	2	.2	.1	0	0	0	58	2,500	0	0	0	0
5	2,100	.2	.1	0	0	0	88	99	0	0	0	0

Daily discharge, in second-feet, of Ute Creek near Logan, N. Mex., for 1904–1906, 1909–1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
6	1,400	0.1	0.1	0	0	0	310	24	0	0	0	0
7	300	.1	.1	0	0	0	136	24	0	0	0	0
8	8	.1	.1	0	0	0	136	13	0	0	0	0
9	4	.1	.1	0	0	0	640	6	0	0	0	0
10	4	.1	.1	0	0	0	8,020	2,800	0	0	0	0
11	4	.1	.1	0	0	0	6,000	120	0	0	0	0
12	4	.1	.1	0	0	0	4,760	1,050	0	0	0	0
13	4	.2	.1	0	0	0	3,600	22	0	0	0	0
14	4	.2	.1	0	0	0	2,600	42	0	0	0	0
15	4	.2	.1	0	0	0	2,700	42	0	0	0	0
16	.2	.2	.1	0	0	0	1,680	4	0	0	0	0
17	.2	.2	.1	0	0	0	88	200	0	0	0	0
18	.2	.2	.1	0	0	0	67	3,600	0	0	0	0
19	.2	.2	.1	0	0	0	58	720	0	0	0	0
20	.2	.1	.1	0	0	0	49	84	0	0	0	0
21	.2	.1	.1	0	0	0	49	6	0	0	0	0
22	.2	.1	.1	0	0	0	13	9	0	0	0	0
23	.2	.1	.1	0	0	0	8	2	0	0	0	0
24	.2	.1	.1	0	0	0	.2	8	0	0	0	0
25	.2	.1	.1	0	0	0	.0	4	0	0	0	0
26	.2	.1	.1	0	0	88	.0	2	0	0	0	0
27	.2	.1	.1	0	0	33	.0	0	0	0	0	0
28	.2	.1	.1	0	0	27	.0	0	0	0	0	0
29	.2	......	.1	0	0	21	.0	0	0	0	0	0
30	.2	......	.1	0	0	21	21	0	0	0	0	0
31	.2	......	.1	......	0	......	2,500	0	......	0	......	0

Daily discharge, in second-feet, of Ute Creek near Logan, N. Mex., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.								
1	0	55	0.0	9	11	11	1	6
2	0	31	19	7	3	3	1	8
3	0	31	11	9	5	1	1	8
4	0	18	0	5	7	7	1	7
5	0	5	0	3	7	11	1	6
6	0	2	0	3	7	2	1	4
7	0	.5	130	3	7	1	.2	2
8	0	.0	0	2	7	1	.2	2
9	0	.0	31	2	1,080	.2	.2	2
10	0	.0	0	0	500	.2	.2	2
11	0	.0	950	0	152	.2	.0	2
12	0	.0	500	0	18	.2	.0	2
13	0	.0	750	0	1	.2	.0	2
14	0	.0	65	0	1	.2	.0	2
15	0	.0	19	0	1	.0	.0	3
16	7,100	.0	11	0	1	.0	.0	3
17	200	.0	2	0	11	.0	.0	3
18	10	46	2	0	9	.0	.0	3
19	1.0	.0	84	0	3	.0	.0	3
20	.5	.0	1,600	0	2	.0	.0	3
21	.5	.0	750	0	0	.0	.0	3
22	1.0	.0	5,900	0	0	.0	.0	3
23	.0	.0	40	1,080	0	.0	.0	3
24	.0	.0	58	255	0	.0	.0	3
25	.0	.0	8	2,600	0	.0	.0	3
26	.0	.0	4	200	0	.0	1	3
27	.0	.5	4	230	0	.0	2	3
28	2,600	.0	40	255	0	.0	2	3
29	1,700	.0	16	43	0	14	3	3
30	1,300	.0	16	29	29	5	3	3
31	106	....	.5	18	....	1	....	3

NOTE.—The finding of an error in obtaining the cross section of the stream necessitated the revision of all high-water discharges for previous years. The corrected daily discharges are published above. These were determined from rating curves covering short periods of time and by the indirect method for shifting channels.

Monthly discharge of Ute Creek near Logan, N. Mex., for 1904-1906, 1909-1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1904.					
August 14-31	6,400	0	423	15,100	B.
September	19,000	0	1,200	71,400	B.
October	700	0	63	3,870	B.
November	0	0	0	0	
December	2	0	.032	2	C.
The period				90,400	
1905.					
January	3.9	0	1.40	86	C.
February	166	.2	18.5	1,030	C.
March	26	.2	10.9	670	C.
April	2,400	.2	395	23,500	B.
May	18,000	0	1,550	95,300	B.
June	150	0	14.2	845	C.
July	5,000	7	353	21,700	B.
August	4,300	0	489	30,100	B.
September	900	0	90.8	5,400	B.
October	2	0	.26	16	C.
November	750	0	85.1	5,060	B.
December	65	0	16.3	1,000	C.
The year	18,000	0	255	185,000	
1906.					
January	31	5	13.3	818	C.
February	19	2	5.57	309	C.
March	2	0	.065	4	C.
April	65	0	6.8	405	C.
May	300	0	21.2	1,300	C.
June	3,200	0	124	7,380	B.
The period				10,200	
1909.					
May	67	0	2.60	160	C.
June	1,330	0	121	7,200	B.
July	0	0	0	0	
August	1,260	0	120	7,380	B.
September	12,500	0	521	31,000	B.
October	310	0	71	4,370	B.
November	2	0	.067	3.98	C.
December	13	1	5.52	339	C.
The period				50,500	
1910.					
January	2,100	.2	126	7,750	B.
Febraury	.2	.1	.14	7.8	C.
March	.1	.1	.10	6.2	C.
April	.0	.0	.0	0	
May	.0	.0	.0	0	
June	88	.0	6.33	377	C.
July	8,020	.0	1,090	67,000	B.
August	3,600	.0	465	28,600	B.
September	6	.0	.2	12.3	C.
October	.0	.0	.0	0	
November	.0	.0	.0	0	
December	.0	.0	.0	0	
The year	8,020	0	143	104,000	
1911.					
January	0	0	.00	0	
February		0	.25	14	C.
March	0	0	.00	0	
April	0	0	.00	0	
May	7,100	0	420	25,800	B.
June	55	0	6.3	375	C.
July	5,900	0	355	21,800	B.
August	2,600	0	153	9,410	B.
September	1,080	0	62.1	3,700	B.
October	14	0	1.88	116	C.
November	3	0	.59	35	C.
December	8	2	3.4	209	C.
The year	7,100	0	85.0	61,500	

YAZOO RIVER BASIN.

TALLAHATCHIE RIVER AT BATESVILLE, MISS.

Location.—At the county highway bridge 1 mile west of Batesville and about 2 miles below the crossing of the Illinois Central Railroad.

Records available.—June 15, 1906, to December 31, 1911, except from August 1 to September 19, 1906.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to the bridge; datum unchanged.

Channel.—Bed is soft and liable to change.

Discharge measurements.—Made from the downstream side of the wagon bridge.

Floods.—The flood of April 20, 1911, reached a height of 18.9 feet above the gage zero.

Winter flow.—Ice does not affect the flow.

Accuracy.—Good. Discharge rating curve has remained fairly constant.

Cooperation.—Station is maintained in cooperation with the Tallahatchie Drainage Commission.

Discharge measurements of Tallahatchie River at Batesville, Miss., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Aug. 23	R. E. Robertson	10.54	3,890	Nov. 14	R. E. Robertson	3.02	624
23	do	10.54	4,000	14	do	3.02	614

Daily gage height, in feet, of Tallahatchie River at Batesville, Miss., for 1911.

[J. G. Goff, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.1	4.2	5.8	6.7	11.2	4.15	3.6	7.2	5.1	2.1	2.1	2.8
2	8.2	4.4	5.8	7.2	9.8	3.95	4.0	7.0	4.9	2.2	2.1	2.8
3	7.4	4.1	5.7	10.0	9.0	3.75	4.1	5.9	4.3	2.2	2.1	2.7
4	7.1	4.0	4.9	11.1	8.3	3.55	3.9	5.7	3.6	2.2	2.1	2.7
5	7.0	5.8	6.1	11.3	7.9	3.45	3.4	6.0	3.5	2.2	2.1	2.7
6	7.2	4.6	6.4	11.1	9.0	3.35	3.1	6.0	2.9	2.2	2.4	2.7
7	7.2	5.3	6.7	11.0	6.0	3.25	3.0	6.4	3.3	2.2	2.7	2.7
8	7.7	5.3	6.6	11.1	5.5	3.15	2.8	6.2	3.2	2.2	2.9	2.7
9	7.8	7.8	6.7	13.0	5.0	3.15	2.8	5.7	3.2	2.2	3.0	2.6
10	8.0	7.7	5.8	14.3	4.85	3.15	2.6	5.5	3.1	2.2	2.6	2.8
11	8.1	7.7	5.1	16.2	4.65	3.15	2.6	5.3	3.7	1.8	3.2	7.5
12	8.2	8.8	4.7	16.3	4.45	3.05	2.6	5.0	4.1	2.4	3.1	10.4
13	8.1	9.1	4.5	16.3	4.25	2.9	3.0	4.5	4.8	2.5	2.9	9.6
14	7.8	9.7	4.3	14.8	4.15	2.85	3.0	3.8	4.5	2.8	2.9	9.2
15	5.1	10.4	4.1	16.0	4.05	2.75	3.5	3.7	4.1	3.0	2.9	12.2
16	4.4	10.7	4.0	16.5	3.95	2.75	3.5	3.7	3.6	3.0	2.8	14.0
17	4.1	11.1	3.9	16.8	3.85	2.65	3.5	5.3	3.1	2.7	2.9	17.6
18	3.9	11.3	3.8	16.7	3.75	2.65	3.4	5.9	3.1	2.6	3.3	17.7
19	3.2	11.6	3.8	18.1	3.65	2.6	3.4	7.0	3.0	2.6	3.1	17.6
20	3.6	11.8	3.9	18.9	3.55	2.7	3.4	7.4	2.8	2.6	3.2	17.4
21	3.6	11.1	4.0	18.0	4.25	2.75	3.6	9.0	2.7	2.6	3.2	17.2
22	3.6	10.0	4.1	17.4	6.4	2.65	4.6	10.0	2.6	2.6	3.2	16.6
23	3.5	9.0	4.3	17.0	8.2	2.65	5.1	10.4	2.6	2.5	3.2	16.2
24	3.4	8.2	4.4	17.4	11.7	3.1	5.4	10.2	2.5	2.4	3.1	15.6
25	3.4	7.7	4.4	17.1	12.8	3.35	6.1	9.9	2.5	2.4	3.1	13.6
26	3.4	7.2	5.5	16.4	12.5	3.0	6.8	9.1	2.45	2.4	3.0	14.8
27	3.6	6.7	6.8	15.7	10.7	3.0	9.5	8.0	2.4	2.2	2.9	18.2
28	3.9	6.3	5.9	14.8	8.8	3.05	9.5	6.8	2.3	2.2	2.9	18.4
29	4.1	......	6.0	14.0	7.4	4.6	9.7	5.9	2.25	2.1	2.8	16.9
30	4.4	......	6.4	12.5	6.0	3.4	9.5	5.7	2.12	2.4	2.8	16.8
31	4.6	......	6.7	......	4.85	......	7.0	5.6	......	2.6	......	16.6

Daily discharge, in second-feet, of Tallahatchie River at Batesville, Miss., in 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,240	1,030	1,650	2,040	4,700	1,010	815	2,290	1,360	335	335	549
2	2,800	1,100	1,650	2,290	3,760	937	955	2,190	1,290	365	335	549
3	2,390	991	1,600	3,900	3,260	866	991	1,690	1,060	365	335	517
4	2,240	955	1,290	4,680	2,860	798	919	1,600	815	365	335	517
5	2,190	1,650	1,770	4,820	2,650	764	747	1,730	781	365	335	517
6	2,290	1,170	1,910	4,680	3,260	730	645	1,730	581	365	425	517
7	2,290	1,440	2,040	4,600	1,730	696	613	1,910	713	365	517	517
8	2,540	1,440	2,000	4,680	1,520	662	549	1,820	679	365	581	517
9	2,600	2,600	2,040	6,270	1,320	662	549	1,600	679	365	613	485
10	2,700	2,540	1,650	7,610	1,270	662	485	1,520	645	365	485	549
11	2,750	2,540	1,360	10,100	1,190	662	485	1,440	849	260	679	2,440
12	2,800	3,140	1,210	10,200	1,120	629	485	1,320	991	425	645	4,190
13	2,750	3,320	1,140	10,200	1,040	581	613	1,140	1,250	455	581	3,640
14	2,600	3,700	1,060	8,190	1,010	565	613	883	1,140	549	581	3,390
15	1,360	4,180	991	9,760	973	533	781	849	991	613	581	5,560
16	1,100	4,390	955	10,500	937	533	781	849	815	613	549	7,280
17	991	4,680	919	11,000	901	501	781	1,440	645	517	581	12,200
18	919	4,820	883	10,800	866	501	747	1,690	645	485	713	12,300
19	679	5,060	883	13,000	832	485	747	2,190	613	485	645	12,200
20	815	5,220	919	14,200	798	517	747	2,390	549	485	679	11,900
21	815	4,680	955	12,800	1,040	533	815	3,260	517	485	679	11,600
22	815	3,900	991	11,900	1,910	501	1,170	3,900	485	485	679	10,700
23	781	3,260	1,060	11,300	2,800	501	1,360	4,180	485	455	679	10,100
24	747	2,800	1,100	11,900	5,140	645	1,480	4,040	455	425	645	9,200
25	747	2,540	1,100	11,400	6,090	730	1,770	3,830	455	425	645	6,840
26	747	2,290	1,520	10,400	5,820	613	2,090	3,320	440	425	613	8,190
27	815	2,040	2,090	9,340	4,390	613	3,570	2,700	425	365	581	13,100
28	919	1,860	1,690	8,190	3,140	629	3,570	2,090	395	365	581	13,400
29	991	....	1,730	7,280	2,390	1,170	3,700	1,690	380	335	549	11,100
30	1,100	....	1,910	5,820	1,730	747	3,570	1,600	341	425	549	11,000
31	1,170	....	2,040	....	1,270	....	2,190	1,560	....	485	....	10,700

Note.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Tallahatchie River at Batesville, Miss., for 1911.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	2,800	679	1,640	A.
February	5,220	955	2,830	A.
March	2,090	883	1,420	A.
April	14,200	2,040	8,460	A.
May	6,090	798	2,310	A.
June	1,170	485	666	A.
July	3,700	485	1,270	A.
August	4,180	849	2,080	A.
September	1,360	341	716	A.
October	613	260	425	B.
November	713	335	558	A.
December	13,400	485	6,330	A.
The year	14,200	260	2,390	

TALLAHATCHIE RIVER AT PHILIPP, MISS.

Location.—At the Yazoo & Mississippi Valley Railroad bridge at Philipp, Miss.

Records available.—September 6, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical timber attached to a bridge pier; datum unchanged.

Channel.—Fairly permanent and good for discharge measurements at all but high flood stages when some water, difficult to measure, passes through distant bayous.

Discharge measurements.—Made from the railroad bridge.

Floods.—The flood of April 28, 1911, reached a height of 138.6 feet above the gage datum, which is mean sea level.

Winter flow.—Ice does not affect the flow.

Accuracy.—Records fair.

Cooperation.—Station maintained in cooperation with the Tallahatchie Drainage Commission.

Discharge measurements of Tallahatchie River at Philipp, Miss., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Aug. 21	R. E. Robertson	119.80	4,660
Nov. 18	do	112.88	1,070

Corrected daily gage height, in feet, of Tallahatchie River at Philipp, Miss., for 1910.

Day.	Feb.	Mar.	Day.	Feb.	Mar.	Day.	Feb.	Mar.
1		128.1	11			21	123.2	
2		128.6	12			22	124.0	
3		129.0	13			23	125.0	
4		129.3	14			24	125.8	
5			15			25	126.4	
6			16			26	126.9	
7			17			27	127.4	
8			18			28	127.8	
9			19	120.1		29		
10			20	121.4		30		
						31		

NOTE.—The gage height for Feb. 19 to Mar. 4, 1910, published in Water-Supply Paper No. 287 were found to be in error. The above values are correct. Mar. 5 and 6 are also evidently in error, but the correct values for those two days are not known. These corrections change the mean discharge for February to 6,260 second-feet, March 8,230 second-feet., and for the year to 5,350 second-feet.

Daily gage height, in feet, of Tallahatchie River at Philipp, Miss., for 1911.

[J. P Mahoney, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	117.1	115.2	127.9	122.0	138.5	124.2	116.1	119.3	121.2	112.5	112.0	112.8
2	118.4	115.7	127.8	122.0	138.4	123.4	115.6	119.5	120.6	112.4	112.0	112.8
3	120.0	115.9	127.5	121.9	138.3	121.6	115.4	119.8	120.0	112.3	112.0	112.8
4	121.5	115.8	127.1	122.2	138.2	120.1	115.4	119.8	119.4	112.3	111.9	112.7
5	121.9	116.0	126.6	124.0	138.0	118.6	115.3	119.4	118.8	112.2	111.9	112.7
6	122.1	115.9	126.0	125.7	137.9	117.5	115.2	118.9	118.3	112.2	111.9	112.7
7	122.3	115.8	125.4	127.0	137.8	116.6	115.0	118.6	117.8	112.2	112.0	112.7
8	122.5	117.0	124.9	128.2	137.6	116.1	115.2	118.3	117.0	112.1	112.2	112.6
9	122.6	118.9	123.7	129.2	137.4	115.8	114.9	118.0	116.2	112.1	112.6	112.6
10	122.8	121.0	123.4	130.0	137.2	115.7	114.3	117.8	115.9	112.2	112.9	112.6
11	122.8	122.4	122.9	130.8	137.0	115.4	113.8	117.6	115.5	112.4	113.2	113.5
12	122.8	123.4	122.0	131.6	136.8	115.1	113.7	117.1	115.2	112.5	113.3	116.3
13	122.6	124.2	120.9	132.2	136.6	114.8	113.5	117.1	115.0	112.6	113.1	120.1
14	122.1	124.8	119.9	132.7	136.2	114.6	113.6	117.3	114.9	112.6	113.1	122.5
15	122.1	125.3	118.9	133.3	135.8	114.3	113.6	117.0	115.3	112.8	113.0	123.8
16	120.6	125.7	118.0	133.7	135.4	114.1	113.8	116.5	115.6	112.9	112.9	124.7
17	119.4	126.0	117.2	134.2	134.9	113.9	114.2	116.1	115.7	113.0	112.9	126.8
18	118.0	126.4	116.6	134.5	134.3	113.8	114.5	116.4	115.5	112.9	112.9	127.8
19	116.8	126.7	116.2	135.3	133.3	113.7	114.6	117.1	115.0	112.9	112.9	129.0
20	116.0	127.0	116.3	135.8	132.3	113.7	114.6	118.3	114.5	112.8	113.0	129.9
21	115.3	127.2	116.3	136.3	131.1	113.6	114.5	119.5	114.1	112.7	113.2	130.5
22	114.7	127.4	116.4	136.8	129.7	113.8	114.3	120.4	113.6	112.6	113.2	131.2
23	114.4	127.7	116.4	137.3	128.4	113.8	114.1	121.0	113.3	112.7	113.2	131.7
24	114.2	127.8	116.5	137.7	127.2	114.3	114.3	121.4	113.0	112.7	113.2	132.2
25	114.1	127.9	116.5	138.1	126.5	114.2	114.8	121.8	112.9	112.6	113.1	132.5
26	114.1	127.9	116.7	138.3	126.1	114.5	115.7	122.2	112.8	112.5	113.0	133.1
27	114.1	128.1	118.5	138.5	126.0	115.0	117.3	122.5	112.8	112.4	113.0	134.5
28	114.0	128.1	120.4	138.6	126.0	115.6	118.0	122.6	112.7	112.2	113.0	134.8
29	114.1		121.5	138.6	126.0	116.6	118.7	122.5	112.6	112.2	113.0	135.3
30	114.2		121.6	138.6	125.9	116.6	119.2	122.2	112.5	112.1	112.9	136.0
31	114.5		121.8		125.5		119.4	121.8		112.1		136.7

Daily discharge, in second-feet, of Tallahatchie River at Philipp, Miss., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,520	1,770	8,740	5,200	25,400	6,520	2,100	3,620	4,720	1,030	940	1,090
2	3,150	1,940	8,680	5,200	25,100	6,040	1,910	3,730	4,360	1,010	940	1,090
3	4,000	2,020	8,500	5,140	24,800	4,960	1,840	3,890	4,000	990	940	1,090
4	4,900	1,980	8,260	5,320	24,600	4,060	1,840	3,890	3,680	990	925	1,070
5	5,140	2,060	7,960	6,400	24,100	3,250	1,800	3,680	3,360	972	925	1,070
6	5,260	2,020	7,600	7,420	23,800	2,700	1,770	3,410	3,100	972	925	1,070
7	5,380	1,980	7,240	8,200	23,500	2,300	1,700	3,250	2,840	972	940	1,070
8	5,500	2,480	6,940	8,920	23,000	2,100	1,770	3,100	2,480	956	972	1,050
9	5,560	3,410	6,220	9,520	22,500	1,980	1,660	2,940	2,140	956	1,060	1,050
10	5,680	4,600	6,040	10,000	22,000	1,940	1,470	2,840	2,020	972	1,110	1,050
11	5,680	5,440	5,740	10,500	21,500	1,840	1,320	2,750	1,880	1,010	1,170	1,250
12	5,680	6,040	5,200	11,000	21,000	1,740	1,300	2,520	1,770	1,030	1,200	2,180
13	5,560	6,520	4,540	11,600	20,500	1,630	1,250	2,520	1,700	1,050	1,150	4,060
14	5,260	6,880	3,950	12,100	19,500	1,560	1,270	2,620	1,660	1,050	1,150	5,500
15	5,260	7,180	3,410	12,900	18,500	1,470	1,270	2,480	1,800	1,090	1,130	6,280
16	4,360	7,420	2,940	13,500	17,500	1,410	1,320	2,260	1,910	1,110	1,110	6,820
17	3,680	7,600	2,570	14,500	16,300	1,350	1,440	2,100	1,940	1,130	1,110	8,060
18	2,940	7,840	2,300	15,300	14,800	1,320	1,530	2,220	1,880	1,110	1,110	8,680
19	2,390	8,020	2,140	17,200	12,900	1,300	1,560	2,520	1,700	1,110	1,110	9,400
20	2,060	8,200	2,180	18,500	11,700	1,300	1,560	3,100	1,530	1,090	1,130	9,940
21	1,800	8,320	2,180	19,700	10,700	1,270	1,530	3,730	1,410	1,070	1,170	10,300
22	1,600	8,440	2,220	21,000	9,820	1,320	1,470	4,240	1,270	1,050	1,170	10,700
23	1,500	8,620	2,220	22,400	9,040	1,320	1,410	4,600	1,200	1,070	1,170	11,100
24	1,440	8,680	2,260	23,300	8,320	1,470	1,470	4,840	1,130	1,070	1,170	11,600
25	1,410	8,740	2,260	24,300	7,900	1,440	1,630	5,080	1,110	1,050	1,150	11,900
26	1,410	8,740	2,340	24,800	7,660	1,530	1,940	5,320	1,090	1,030	1,130	12,600
27	1,410	8,860	3,200	25,400	7,600	1,700	2,620	5,500	1,090	1,010	1,130	15,300
28	1,380	8,860	4,240	25,600	7,600	1,910	2,940	5,560	1,070	972	1,130	16,000
29	1,410	....	4,900	25,600	7,600	2,300	3,300	5,500	1,050	972	1,130	17,200
30	1,440	....	4,960	25,600	7,540	2,300	3,570	5,320	1,030	956	1,110	19,000
31	1,530	....	5,080	....	7,300	....	3,680	5,060	....	956	....	20,700

NOTE.—Daily discharge determined from a rating curve which is fairly well defined but which is affected by the variation in the slope of the river below. This stream is affected by backwater from Mississippi River.

Monthly discharge of Tallahatchie River at Philipp, Miss., for 1911.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	5,680	1,380	3,430	B.
February	8,860	1,770	5,880	B.
March	8,740	2,140	4,740	B.
April	25,600	5,140	14,900	B.
May	25,400	7,300	16,300	B.
June	6,520	1,270	2,240	A.
July	3,680	1,250	1,850	A.
August	5,560	2,100	3,680	B.
September	4,720	1,030	2,060	A.
October	1,130	956	1,030	B.
November	1,200	925	1,080	B.
December	20,700	1,050	7,400	B.
The year	25,600	925	5,380	

YAZOO RIVER AT GREENWOOD, MISS.

Location.—At the highway bridge in the city of Greenwood, about 1 mile below the mouth of Yalobusha River.

Records available.—January 1, 1908, to December 31, 1911. The 1908 gage heights prior to July 15, when the station was established, are from the United States Weather Bureau, whose records began November 1, 1904.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to the highway bridge. The datum, which is sea level, has not been changed. The datum of the United States Weather Bureau gage is 92.5 feet above sea level.

Channel.—Excellent for measurements, and appears to be practically permanent.

Discharge measurements.—Made from the downstream side of the highway bridge.

Floods.—The flood of May 2, 1911, reached a height of 128.9 feet by the gage datum. (On Apr. 7, 1912, the height was 130.7 feet.)

Point of zero flow.—Has not been determined.

Winter flow.—Ice does not affect the flow.

Artificial control.—None.

Accuracy.—Good. Records for back years have been worked up and are published herewith. Discharge rating affected by backwater from Mississippi River.

Discharge measurements of Yazoo River at Greenwood, Miss., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 21	R. E. Robertson	100.12	4,620
Nov. 18	do	94.30	1,540

Daily gage height, in feet, of Yazoo River at Greenwood, Miss., for 1911.

[W. T. Davis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	99.43	96.26	112.37	104.76	128.87	110.17	98.10	99.21	102.40	93.88	93.46	94.10
2	104.49	96.65	112.37	104.75	128.88	109.17	97.76	99.36	101.75	93.81	93.41	94.08
3	108.12	97.04	112.37	104.60	128.80	107.92	97.32	99.59	101.08	93.77	93.38	94.04
4	108.69	97.49	112.34	105.53	128.63	106.51	96.88	99.71	100.47	93.73	93.36	94.00
5	108.65	97.83	112.28	109.24	128.39	104.98	96.62	99.79	99.89	93.69	93.36	93.99
6	108.63	97.98	112.18	110.67	128.08	103.41	96.58	99.64	99.34	93.65	93.46	93.98
7	108.80	97.86	111.99	111.07	127.75	102.02	96.45	99.35	98.81	93.61	93.46	93.99
8	109.05	97.90	111.76	112.14	127.34	100.73	96.49	98.93	98.26	93.57	93.55	93.99
9	109.29	99.62	111.47	113.16	126.93	99.52	96.48	98.56	97.71	93.53	93.85	93.98
10	109.53	102.64	111.10	114.30	126.49	98.53	96.14	98.29	97.10	93.69	94.06	94.01
11	109.77	104.61	110.66	115.23	126.03	97.75	95.83	98.01	96.71	93.79	94.24	96.72
12	109.94	106.10	110.00	116.36	125.55	97.10	95.61	97.74	96.54	94.00	94.38	100.66
13	109.99	107.28	109.09	117.22	125.09	96.66	95.35	99.34	96.36	94.02	94.51	105.55
14	109.94	108.06	107.81	117.79	124.57	96.27	95.78	100.43	96.02	94.05	94.46	108.55
15	109.70	108.77	106.44	118.28	124.06	95.98	96.53	100.99	95.84	93.97	94.41	110.20
16	109.07	109.37	104.94	118.73	123.47	95.70	96.78	100.87	95.93	94.02	94.34	111.85
17	108.01	109.79	103.49	119.10	122.86	95.51	96.67	100.47	96.08	94.20	94.28	112.86
18	106.53	110.12	102.18	119.50	122.23	95.40	96.41	100.09	96.15	94.20	94.26	113.40
19	104.86	110.40	101.21	120.57	121.50	95.22	96.31	99.95	96.06	94.31	94.20	113.98
20	103.21	110.70	100.41	121.70	120.68	95.29	96.25	99.74	95.78	94.33	94.22	114.61
21	101.69	110.89	99.81	122.24	119.82	95.20	96.10	100.26	95.42	94.25	94.26	115.21
22	100.32	110.95	99.32	122.69	118.84	95.67	95.85	101.58	95.06	94.09	94.31	116.19
23	99.17	110.84	99.88	123.23	117.79	95.78	95.70	102.45	94.79	93.96	94.36	117.34
24	98.25	110.62	98.60	123.95	116.76	96.01	95.62	102.90	94.55	93.92	94.42	117.93
25	97.63	110.30	98.41	124.88	115.78	96.45	95.57	103.39	94.39	93.90	94.41	118.14
26	97.17	110.01	99.12	125.97	114.95	96.63	95.88	103.61	94.26	93.86	94.40	118.70
27	96.77	110.50	100.73	126.99	114.11	96.85	96.68	103.66	94.14	93.78	94.40	119.71
28	96.47	112.24	102.40	127.80	113.27	97.61	97.73	103.74	94.07	93.68	94.36	116.40
29	96.26	......	103.52	128.36	112.45	98.29	98.41	103.61	94.03	93.61	94.26	120.82
30	96.16	......	104.16	128.70	111.73	98.35	98.83	103.42	93.96	93.56	94.16	121.66
31	96.11	......	104.58	......	111.00	......	99.06	102.99	......	93.51	......	123.04

Daily discharge, in second-feet, of Yazoo River at Greenwood, Miss., for 1908–1911.

Day	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	6,300	6,230	29,400	24,400	10,800	6,090	4,760	2,540	1,880	1,550	980	1,600
2	7,000	6,790	29,400	24,400	10,600	5,760	4,160	2,400	1,800	1,500	980	1,600
3	7,580	7,140	29,300	24,400	10,600	5,430	3,920	2,460	1,700	1,450	980	1,620
4	8,020	7,850	29,000	24,200	10,400	5,060	3,740	2,460	1,620	1,400	980	1,720
5	8,900	7,720	28,700	24,100	10,400	4,760	3,560	2,680	1,550	1,350	980	1,850
6	9,460	8,020	28,600	23,900	12,800	5,180	3,390	3,000	1,550	1,300	980	2,160
7	9,860	8,500	28,200	23,600	13,600	6,160	3,220	3,310	1,480	1,280	980	3,620
8	10,200	8,980	27,700	22,800	13,300	6,790	3,340	3,000	1,400	1,250	1,000	5,530
9	10,400	9,380	27,500	22,200	13,000	7,420	3,740	2,540	1,350	1,200	980	6,120
10	10,700	10,100	27,000	21,600	12,700	8,100	4,040	2,650	1,320	1,150	1,000	5,980
11	11,000	11,200	26,600	20,900	12,300	8,660	4,340	2,760	1,300	1,100	1,000	5,620
12	11,400	12,700	26,200	20,000	12,200	9,140	4,400	2,900	1,280	1,080	1,000	5,240
13	11,600	14,100	25,800	19,300	11,800	9,620	4,400	3,060	1,250	1,080	1,050	4,940
14	11,600	18,700	25,400	18,500	11,800	10,000	4,340	3,120	1,220	1,080	1,050	4,550
15	11,400	21,500	24,900	17,700	11,600	10,100	4,220	3,000	1,220	1,080	1,120	4,550
16	11,400	22,300	24,400	17,000	11,100	10,300	4,040	2,780	1,200	1,050	1,200	3,860
17	11,500	23,000	24,000	16,300	10,900	10,400	3,740	2,650	1,180	900	1,200	3,530
18	11,600	23,900	23,600	15,700	11,000	10,400	3,440	2,560	1,150	1,050	1,200	3,140
19	11,500	25,400	23,100	14,800	11,300	10,300	3,120	2,480	1,150	1,020	1,200	2,760
20	11,400	27,000	22,600	14,100	11,000	10,200	2,840	2,590	1,150	1,020	1,150	2,460
21	11,300	28,000	22,200	13,400	10,700	10,100	2,700	2,780	1,120	1,000	1,150	2,350
22	11,100	28,700	22,000	12,800	10,200	9,940	2,950	2,780	1,200	1,000	1,150	2,840
23	10,900	29,300	22,300	12,100	9,780	9,700	3,200	2,780	1,450	1,000	1,150	3,920
24	10,700	29,400	23,600	11,400	9,300	9,460	3,220	2,650	1,620	1,000	1,150	3,800
25	10,900	29,600	24,100	11,600	8,900	9,140	3,170	2,620	1,720	980	1,080	3,740
26	10,000	29,800	24,000	11,800	8,580	8,420	3,170	2,560	1,700	980	1,250	3,740
27	9,460	29,800	23,900	11,700	8,180	7,880	3,220	2,380	1,700	950	1,350	3,740
28	8,900	29,600	23,900	11,400	7,800	6,930	3,170	2,250	1,650	950	1,450	3,680
29	8,100	29,600	23,900	11,000	7,420	6,020	3,000	2,150	1,600	950	1,500	3,620
30	7,350	....	24,000	10,800	6,930	5,300	2,900	2,050	1,580	950	1,580	3,530
31	6,440	....	24,200	....	6,440	....	2,730	1,950	....	950	....	3,420
1909.												
1	3,260	2,080	18,400	26,500	18,900	24,000	18,100	2,150	1,260	2,500	1,060	1,660
2	3,060	2,030	18,200	26,100	18,900	24,900	17,600	2,280	1,240	2,340	1,040	1,650
3	2,850	1,990	18,900	25,700	18,300	25,400	16,900	2,310	1,240	2,180	1,040	1,600
4	2,600	1,950	19,300	25,100	18,100	25,800	16,100	2,260	1,220	1,960	1,030	1,540
5	2,520	2,000	19,600	24,500	17,900	26,000	15,600	2,220	1,200	1,740	1,030	1,510
6	2,410	2,220	20,200	23,900	17,700	26,200	14,300	2,140	1,180	1,580	1,030	1,440
7	2,340	2,780	20,200	23,200	17,600	26,400	13,200	2,070	1,160	1,440	1,030	1,600
8	2,410	3,110	20,500	22,600	17,300	26,400	12,100	2,100	1,160	1,340	1,030	1,740
9	2,540	3,260	21,000	21,700	17,000	26,300	11,000	2,170	1,420	1,260	1,020	1,970
10	2,580	4,460	21,300	20,600	16,800	26,600	9,860	2,400	1,620	1,200	1,010	2,290
11	2,560	6,160	21,500	19,500	15,900	26,100	9,030	2,720	1,620	1,160	1,010	2,500
12	2,560	6,900	21,700	18,200	15,000	25,900	7,640	2,770	1,710	1,130	1,000	2,690
13	2,580	6,980	22,400	18,000	14,100	25,700	6,640	2,710	1,840	1,100	995	3,010
14	2,580	7,210	23,400	18,100	13,100	25,400	5,870	2,690	1,950	1,080	990	3,790
15	2,560	9,480	24,000	17,700	12,100	25,100	5,250	2,770	1,960	1,060	995	4,640
16	2,550	11,200	23,800	17,400	11,100	24,800	4,750	2,830	1,940	1,050	1,080	5,130
17	2,660	11,800	23,900	17,100	10,200	24,300	4,370	2,750	1,860	1,040	1,110	5,390
18	2,760	11,600	24,000	17,000	10,100	24,000	4,210	2,540	1,740	1,020	1,140	5,570
19	2,810	12,300	24,200	16,800	9,780	24,000	3,760	2,310	1,580	1,010	1,150	5,750
20	2,900	13,200	25,500	16,700	9,520	23,200	3,420	2,160	1,460	1,020	1,190	5,870
21	3,000	13,800	26,300	16,700	9,510	22,700	3,130	2,050	1,580	1,140	1,370	5,920
22	3,130	14,100	26,700	16,300	9,560	22,300	2,980	1,940	2,070	1,090	1,660	5,940
23	3,220	15,000	26,900	16,400	9,680	22,200	2,820	1,810	2,180	1,070	1,920	5,940
24	3,250	16,400	27,000	17,000	10,100	21,900	2,770	1,680	2,870	1,050	2,080	5,970
25	3,240	17,600	27,100	16,800	12,600	21,300	2,710	1,600	2,900	1,050	2,160	6,310
26	3,100	18,000	27,200	18,500	16,200	20,800	2,590	1,520	2,830	1,050	2,120	6,860
27	2,940	18,200	27,200	19,500	19,000	20,300	2,610	1,450	2,710	1,050	2,050	7,160
28	2,720	18,200	27,200	20,200	20,100	19,800	2,350	1,380	2,600	1,050	1,900	7,220
29	2,550	....	27,100	19,700	20,600	19,200	2,260	1,340	2,560	1,050	1,760	7,240
30	2,340	....	27,000	19,300	21,000	18,700	2,190	1,300	2,540	1,060	1,680	7,270
31	2,180	....	26,700	....	22,500	....	2,150	1,260	....	1,080	....	7,280

Daily discharge, in second-feet, of Yazoo River at Greenwood, Miss., for 1908–1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	7,160	13,300	16,300	3,910	11,100	11,400	9,240	20,800	2,970	1,360	1,360	1,180
2	7,020	12,900	16,500	3,580	11,200	11,200	9,120	20,600	2,840	1,320	1,320	1,180
3	6,850	12,400	16,700	3,360	11,200	10,800	9,000	19,900	2,660	1,300	1,280	1,180
4	6,600	12,000	16,900	3,200	11,300	10,500	9,340	19,200	2,470	1,280	1,260	1,200
5	6,330	11,600	17,000	3,110	11,300	10,300	9,810	18,500	2,340	1,280	1,260	1,250
6	6,720	11,100	17,100	3,050	11,300	10,100	10,700	17,800	2,350	1,440	1,250	1,360
7	8,460	10,500	17,100	3,100	11,200	9,590	11,700	17,100	2,430	2,470	1,250	1,510
8	9,480	9,810	17,000	3,250	11,000	8,890	12,500	16,400	2,400	3,430	1,250	1,840
9	9,780	8,990	16,800	3,470	10,600	8,030	13,300	15,600	2,360	3,440	1,250	1,950
10	10,100	8,070	16,500	3,670	10,100	7,300	14,000	14,700	2,340	3,080	1,250	1,880
11	10,400	7,210	16,000	3,840	9,440	7,240	14,900	13,700	2,340	2,860	1,240	1,860
12	10,700	6,410	15,500	3,930	8,510	7,900	16,000	12,600	2,310	2,710	1,230	1,800
13	10,900	5,660	15,000	3,880	7,460	8,280	17,300	11,500	2,220	2,710	1,230	1,740
14	10,900	5,070	14,600	3,730	6,440	8,480	18,500	10,200	2,100	3,140	1,220	1,680
15	10,800	4,570	15,200	3,660	5,460	8,610	19,600	8,960	1,900	3,820	1,210	1,660
16	10,800	4,140	13,900	4,740	4,680	8,720	20,500	7,830	1,820	3,880	1,200	1,630
17	10,700	5,270	13,600	6,620	4,080	8,700	21,100	6,870	1,730	3,500	1,200	1,580
18	10,600	8,940	13,300	8,230	3,570	8,620	21,600	5,980	1,660	3,110	1,190	1,540
19	10,500	10,300	12,900	9,380	3,360	8,590	22,200	5,160	1,600	2,720	1,180	1,470
20	10,800	10,600	12,500	10,200	3,470	9,460	22,600	4,470	1,550	2,440	1,170	1,430
21	13,000	11,200	12,000	10,800	3,940	10,100	22,700	4,800	1,500	2,370	1,170	1,380
22	14,200	12,700	11,400	11,200	5,520	10,200	22,700	5,870	1,470	2,370	1,160	1,350
23	14,300	13,600	10,700	11,300	7,530	10,300	22,700	5,580	1,440	2,320	1,150	1,550
24	14,200	14,200	9,810	11,300	8,520	10,300	22,500	5,350	1,420	2,200	1,150	2,180
25	14,200	14,700	8,840	11,300	9,170	10,100	22,300	5,220	1,400	2,020	1,150	2,880
26	14,400	15,100	7,870	11,200	9,880	9,900	22,400	5,140	1,400	1,860	1,150	3,080
27	14,500	15,500	6,950	11,100	10,500	9,800	22,400	4,870	1,400	1,720	1,180	2,980
28	14,500	15,900	6,090	11,000	11,000	9,680	22,000	4,460	1,420	1,630	1,170	2,960
29	14,500	....	5,380	11,100	11,500	9,480	21,500	4,040	1,400	1,520	1,170	2,870
30	14,200	....	4,820	11,100	11,600	9,230	21,100	3,530	1,380	1,440	1,170	2,850
31	13,800	....	4,330	....	11,600	....	20,800	3,180	....	1,400	....	2,940
1911.												
1	4,360	2,540	14,700	7,920	36,300	12,500	3,560	4,230	6,230	1,340	1,130	1,450
2	7,720	2,760	14,700	7,910	36,300	11,600	3,370	4,320	5,790	1,300	1,100	1,440
3	10,600	2,970	14,700	7,800	36,200	10,400	3,130	4,450	5,350	1,280	1,090	1,420
4	11,100	3,220	14,600	8,520	35,900	9,310	2,880	4,530	4,980	1,260	1,080	1,400
5	11,100	3,410	14,600	11,600	35,600	8,080	2,740	4,570	4,630	1,240	1,080	1,400
6	11,100	3,490	14,500	13,000	35,100	6,940	2,720	4,480	4,300	1,220	1,130	1,390
7	11,200	3,420	14,300	13,400	34,600	5,960	2,650	4,310	3,990	1,200	1,130	1,400
8	11,400	3,440	14,100	14,400	34,000	5,140	2,670	4,060	3,660	1,180	1,180	1,400
9	11,700	4,470	13,800	15,500	33,400	4,410	2,660	3,840	3,340	1,160	1,320	1,390
10	11,900	6,400	13,400	16,700	32,700	3,820	2,480	3,670	3,000	1,240	1,430	1,400
11	12,100	7,810	13,000	17,800	32,000	3,360	2,320	3,510	2,790	1,300	1,520	2,800
12	12,200	8,980	12,300	19,000	31,300	3,000	2,200	3,360	2,700	1,400	1,590	5,100
13	12,300	9,920	11,500	20,100	30,600	2,760	2,080	4,300	2,600	1,410	1,660	8,540
14	12,200	10,600	10,300	20,700	29,900	2,550	2,290	4,960	2,410	1,420	1,630	11,000
15	12,000	11,200	9,250	21,400	29,100	2,390	2,690	5,290	2,320	1,380	1,600	12,500
16	11,500	11,700	8,060	21,900	28,300	2,250	2,830	5,220	2,360	1,410	1,570	14,200
17	10,500	12,100	6,990	22,400	27,400	2,160	2,770	4,980	2,440	1,500	1,540	15,200
18	9,320	12,400	6,080	23,000	26,500	2,100	2,630	4,750	2,480	1,500	1,530	15,700
19	8,000	12,700	5,440	24,300	25,600	2,010	2,570	4,670	2,430	1,560	1,500	16,400
20	6,800	13,000	4,950	25,800	24,500	2,040	2,540	4,540	2,290	1,560	1,510	17,100
21	5,750	13,200	4,590	26,500	23,400	2,000	2,460	4,860	2,110	1,520	1,530	17,700
22	4,890	13,200	4,290	27,200	22,100	2,240	2,320	5,680	1,930	1,440	1,560	18,800
23	4,200	13,100	4,630	27,900	20,700	2,290	2,250	6,260	1,800	1,380	1,580	20,200
24	3,650	12,900	3,860	28,900	19,500	2,410	2,210	6,580	1,680	1,360	1,610	20,900
25	3,300	12,600	3,750	30,300	18,400	2,650	2,180	6,920	1,600	1,350	1,600	21,200
26	3,040	12,300	4,170	32,000	17,400	2,750	2,340	7,080	1,530	1,330	1,600	21,900
27	2,820	12,800	5,140	33,500	16,500	2,870	2,770	7,110	1,470	1,290	1,600	23,200
28	2,660	14,500	6,230	34,700	15,600	3,290	3,350	7,170	1,440	1,240	1,580	19,100
29	2,540	....	7,010	35,500	14,800	3,670	3,750	7,080	1,420	1,200	1,530	24,700
30	2,490	....	7,470	36,000	14,000	3,710	4,000	6,940	1,380	1,180	1,480	25,800
31	2,460	....	7,780	....	13,300	....	4,140	6,640	....	1,160	....	27,700

NOTE.—Daily discharge determined from a well defined rating curve.

Monthly discharge of Yazoo River at Greenwood, Miss., for 1908–1911.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
1908.				
January	11,600	6,300	9,930	A.
February	29,800	6,230	18,800	A.
March	29,400	22,000	25,500	B.
April	24,400	10,800	17,600	A.
May	13,600	6,440	10,600	A.
June	10,400	4,760	8,090	A.
July	4,760	2,700	3,560	A.
August	3,310	1,950	2,640	A.
September	1,880	1,120	1,440	A.
October	1,550	900	1,120	A.
November	1,580	980	1,130	A.
December	6,120	1,600	3,580	A.
The year	29,800	900	8,620	
1909.				
January	3,260	2,180	2,740	A.
February	18,200	1,950	9,050	A.
March	27,200	18,200	23,500	A.
April	26,500	16,300	19,900	B.
May	22,500	9,510	15,200	A.
June	26,600	18,700	23,900	A.
July	18,100	2,150	7,360	B.
August	2,830	1,260	2,120	A.
September	2,900	1,160	1,840	A.
October	2,500	1,010	1,290	A.
November	2,160	990	1,320	A.
December	7,270	1,440	4,340	A.
The year	27,200	990	9,350	
1910.				
January	14,500	6,330	11,000	A.
February	15,900	4,140	10,400	B.
March	17,100	4,330	12,900	A.
April	11,800	3,050	6,780	A.
May	11,600	3,360	8,630	A
June	11,400	7,240	9,390	A.
July	22,700	9,000	17,600	A.
August	20,800	3,180	10,300	B.
September	2,970	1,380	1,960	A.
October	3,880	1,280	2,330	A.
November	1,360	1,150	1,210	A.
December	3,080	1,180	1,870	A.
The year	22,700	1,150	7,880	
1911.				
January	12,800	2,460	7,960	B.
February	14,500	2,540	8,970	A.
March	14,700	3,750	9,360	B.
April	36,000	7,800	21,500	A.
May	36,300	13,300	26,800	A.
June	12,500	2,000	4,360	B.
July	4,140	2,080	2,760	A.
August	7,170	3,360	5,170	A.
September	6,230	1,380	2,880	A.
October	1,560	1,160	1,330	A.
November	1,660	1,080	1,430	A.
December	27,700	1,390	12,100	A.
The year	36,300	1,080	8,730	

COLDWATER RIVER AT SAVAGE, MISS.

Location.—At the Yazoo & Mississippi Valley Railroad bridge at Savage, Miss., about 3 miles above the mouth of Arkabutla Creek.

Records available.—October 1, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical timber in two sections on the left bank just below the bridge; datum unchanged.

Channel.—Good, and practically permanent. There is some overflow water difficult to measure at high floods.

Discharge measurements.—Made from the railroad bridge.

Floods.—The flood of April 18, 1910, reached a height of 187 feet above the gage datum, which is mean sea level.

Winter flow.—Ice does not affect the flow.

Accuracy.—Fair.

Cooperation.—Station maintained in cooperation with the Tallahatchie Drainage Commission.

Discharge measurements of Coldwater River at Savage, Miss., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 15	R. E. Robertson	166.58	132
15	....do	166.58	142

Daily gage height, in feet, of Coldwater River at Savage, Miss., for 1911.

[David J. Hill, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	174.7	168.0	169.8	171.5	178.9	167.7	169.3	168.4	176.5	166.5	166.4	167.0
2	175.7	167.6	170.0	169.8	178.0	167.4	168.4	170.0	176.9	166.5	166.4	167.0
3	176.0	167.4	169.5	168.5	176.7	167.0	167.9	169.4	175.0	166.5	166.4	167.0
4	176.5	167.3	169.2	175.8	174.5	167.0	167.0	171.1	173.4	166.5	166.4	167.0
5	176.6	167.2	169.3	184.0	172.9	171.0	166.9	171.4	170.7	166.5	166.4	167.1
6	176.4	169.3	169.3	186.8	171.4	171.0	167.0	170.1	168.5	166.5	166.4	167.0
7	174.9	175.0	168.9	186.9	169.8	168.3	167.0	169.3	167.5	166.5	166.4	167.0
8	172.6	176.4	168.4	....	169.0	168.3	167.0	169.0	167.0	166.5	166.4	166.8
9	170.4	178.2	168.2	186.0	168.5	168.4	167.0	170.0	166.9	166.5	166.4	166.8
10	169.1	179.3	168.0	186.8	168.0	168.3	167.0	169.8	166.9	166.5	166.4	166.7
11	168.5	180.0	167.8	185.0	167.9	167.0	167.2	168.6	170.0	166.5	166.4	170.1
12	168.0	180.0	167.6	186.5	167.7	166.9	167.5	167.8	171.1	166.5	166.4	171.0
13	167.8	182.0	167.5	184.0	167.4	166.9	167.4	167.4	171.5	166.5	166.5	176.0
14	167.7	183.8	167.4	183.7	167.1	166.9	167.3	166.9	171.0	166.5	166.5	170.5
15	167.5	183.1	167.3	183.9	167.0	166.7	168.2	166.9	169.8	166.5	166.5	178.8
16	167.3	183.0	167.1	185.6	167.0	166.6	168.4	167.3	168.4	166.5	166.5	180.5
17	167.3	182.9	167.0	186.9	167.0	166.4	168.9	172.0	167.3	166.5	166.5	181.2
18	167.0	182.4	167.0	186.8	166.9	166.4	167.8	172.3	167.0	166.5	166.5	183.0
19	167.0	182.3	167.3	186.7	166.9	166.4	167.0	170.2	166.8	166.5	166.5	184.5
20	167.0	182.0	167.8	186.6	166.9	167.5	166.8	170.8	166.7	166.5	166.5	184.8
21	167.0	178.5	168.1	186.8	177.0	167.8	166.4	171.0	166.8	166.5	166.5	184.4
22	166.9	177.1	169.5	186.7	180.3	167.9	169.0	172.7	166.7	166.5	166.5	184.0
23	166.9	176.8	169.5	186.0	181.0	169.8	171.2	173.6	166.7	166.5	166.5	183.6
24	166.9	175.0	168.7	185.5	180.0	169.4	172.9	174.2	166.7	166.5	166.5	180.3
25	167.1	173.4	168.0	184.9	178.8	169.8	173.6	174.7	166.7	166.5	166.5	181.9
26	167.1	170.3	169.7	184.3	176.7	168.3	173.9	174.5	166.6	166.5	166.5	181.7
27	167.2	170.0	174.8	183.5	173.5	168.2	174.0	174.0	166.6	166.5	166.5	181.5
28	169.2	169.1	174.9	182.6	170.4	168.0	173.9	173.5	166.5	166.5	166.5	182.5
29	169.3	....	174.0	181.0	168.9	168.0	172.5	174.4	166.5	166.5	166.5	183.0
30	169.4	....	174.2	180.0	168.0	168.0	170.0	175.0	166.5	166.5	166.6	184.1
31	168.6	....	173.2	....	167.8	....	169.0	176.0	....	166.4	....	185.9

Daily discharge, in second-feet, of Coldwater River at Savage, Miss., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,140	248	421	619	2,420	223	370	284	1,560	132	125	167
2	1,360	215	443	421	2,050	199	284	443	1,680	132	125	167
3	1,430	199	390	293	1,620	167	239	380	1,200	132	125	167
4	1,560	191	360	1,380	1,100	167	167	570	894	132	125	167
5	1,590	183	370	6,160	815	558	160	606	522	132	125	175
6	1,540	370	370	14,000	606	558	167	454	293	132	125	167
7	1,180	1,200	330	14,500	421	275	167	370	207	132	125	167
8	770	1,540	284	12,400	340	275	167	340	167	132	125	153
9	487	2,130	266	10,400	293	284	167	443	160	132	125	153
10	350	2,600	248	14,000	248	275	167	421	160	132	125	146
11	293	2,950	231	7,700	239	167	183	302	443	132	125	454
12	248	2,950	215	12,600	223	160	207	231	570	132	125	558
13	231	4,250	207	6,160	199	160	199	199	619	132	132	1,430
14	223	5,390	199	5,810	175	160	191	160	558	132	132	1,900
15	207	5,190	191	6,040	167	146	266	160	421	132	132	2,370
16	191	5,100	175	9,140	167	139	284	191	284	132	132	3,240
17	191	5,010	167	14,500	167	125	330	685	191	132	132	3,680
18	167	4,570	167	14,000	160	125	231	727	167	132	132	5,100
19	167	4,490	191	13,500	160	125	167	465	153	132	132	6,830
20	167	4,250	231	13,000	160	207	153	534	146	132	132	7,330
21	167	2,250	257	14,000	1,710	231	125	558	153	132	132	6,680
22	160	1,740	390	13,500	3,120	239	340	785	146	132	132	6,160
23	160	1,650	390	10,400	3,540	421	582	928	146	132	132	5,700
24	160	1,200	311	8,870	2,950	380	815	1,040	146	132	132	3,120
25	175	894	248	7,510	2,370	421	928	1,140	146	132	132	4,170
26	175	476	410	6,540	1,620	275	982	1,100	139	132	132	4,030
27	183	443	1,160	5,590	910	266	1,000	1,000	139	132	132	3,890
28	360	350	1,180	4,740	487	248	982	910	132	132	132	4,650
29	370	....	1,000	3,540	330	248	755	1,080	132	132	132	5,100
30	380	....	1,040	2,950	248	248	443	1,200	132	132	139	6,240
31	302	....	862	....	231	....	340	1,430	....	125	....	10,000

NOTE.—Daily discharge determined from a fairly well-defined rating curve below 6,000 second-feet. Discharge interpolated Apr. 3 and Dec. 14. Gage height on Dec. 14 considered to be in error.

Monthly discharge of Coldwater River at Savage, Miss., for 1911.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	1,590	160	519	B.
February	5,390	183	2,220	B.
March	1,180	167	410	B.
April	14,500	293	8,480	B.
May	3,540	160	943	B.
June	558	125	249	B.
July	1,000	125	373	B.
August	1,430	160	617	B.
September	1,680	132	394	B.
October	132	125	132	B.
November	139	125	129	B.
December	10,000	146	3,040	B.
The year	14,500	125	1,440	

YALOBUSHA RIVER AT GRENADA, MISS.

Location.—At the highway bridge in the western part of Grenada, about half a mile below the Illinois Central Railroad bridge and three-fourths of a mile below the mouth of Batawpan Bogue.

Records available.—June 14, 1906, to November 2, 1906, and July 7, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to the wagon bridge. After having been twice stolen the chain has for some time been carried to and from the station by the observer. The datum has not been changed.

Channel.—Mostly in soft rock or firm clay.

Discharge measurements.—Made from the downstream side of the wagon bridge.

Floods.—The flood of July 10, 1910, reached a height of 25.7 feet above the gage datum.

Winter flow.—Ice does not affect the flow.

Accuracy.—Fair; there has been considerable change in the discharge rating curve.

Cooperation.—Station was maintained in cooperation with the Tallahatchie Drainage Commission.

Discharge measurements of Yalobusha River at Grenada, Miss., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 24	R. E. Robertson	8.96	2,260
24	.....do	8.90	2,250
Nov. 13	.....do	1.75	181
13	.....do	1.75	181

Daily gage height, in feet, of Yalobusha River at Grenada, Miss., for 1911.

[J. E. Caldwell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	15.0	2.6	19.9	6.3	14.8	3.0	3.0	2.2	2.4	1.5	1.2	1.9
2	18.2	2.6	19.4	5.6	13.0	2.85	3.2	2.1	2.4	1.4	1.4	1.7
3	21.7	2.6	17.1	5.4	10.8	2.85	3.3	2.2	2.3	1.2	1.5	1.6
4	21.7	3.0	16.9	21.8	8.5	2.75	3.4	2.4	2.5	1.2	1.7	1.5
5	21.7	3.1	16.4	22.3	4.9	2.7	3.7	2.7	2.8	1.1	1.9	1.4
6	21.3	3.1	15.7	23.4	4.1	2.55	3.7	2.7	3.0	1.0	2.0	1.4
7	20.5	3.1	14.9	21.1	3.8	2.45	3.8	2.9	3.2	.9	2.0	1.2
8	19.3	3.1	13.9	23.2	3.6	2.45	3.8	2.7	3.5	.8	2.2	1.1
9	18.6	13.3	12.9	24.1	3.5	2.35	3.7	2.6	3.7	.65	2.3	.95
10	17.9	15.1	11.4	23.7	3.3	2.3	3.6	2.4	3.8	.6	2.0	.95
11	16.9	14.9	9.9	23.3	3.1	2.2	3.5	2.3	4.0	.9	1.9	2.0
12	15.0	15.6	6.9	22.6	3.0	2.15	3.3	2.2	3.6	1.1	1.8	3.5
13	11.0	15.1	4.5	22.0	2.85	2.1	3.0	2.3	3.4	1.2	1.8	5.2
14	7.7	14.6	3.9	21.0	2.85	1.95	2.8	2.5	3.2	1.2	2.0	10.0
15	5.8	14.4	3.7	21.2	2.75	1.8	3.1	2.6	3.1	1.3	2.2	20.6
16	4.3	12.9	3.5	21.4	2.65	1.6	3.2	3.4	2.9	1.4	2.3	21.3
17	3.5	12.4	2.9	21.7	2.55	1.5	3.3	4.0	2.8	1.6	2.4	21.5
18	3.0	12.3	2.8	21.5	2.5	1.85	3.4	4.7	2.8	2.0	2.6	22.0
19	2.8	11.4	4.4	24.0	2.85	1.25	3.3	5.7	2.7	2.1	2.7	23.1
20	2.75	10.3	4.3	25.1	2.95	1.25	3.2	6.5	2.6	2.2	2.9	21.8
21	2.7	8.9	4.1	25.2	4.0	1.45	3.0	10.1	2.5	2.4	3.0	20.1
22	2.65	7.4	3.9	25.4	5.3	1.6	3.1	11.3	2.3	2.5	3.2	19.0
23	2.6	6.9	3.7	24.7	7.9	1.75	2.9	9.8	2.2	2.4	3.4	18.7
24	2.6	6.6	3.4	23.5	9.5	2.1	2.8	9.0	2.2	2.3	3.4	18.2
25	2.6	6.5	3.2	22.6	7.5	2.85	2.8	8.0	2.1	2.2	3.3	18.0
26	2.55	6.4	5.9	21.3	5.2	3.0	2.7	6.8	2.0	2.0	3.0	17.9
27	2.55	18.9	10.8	20.6	3.6	3.4	2.7	5.4	1.9	1.8	2.8	23.0
28	2.5	18.9	9.4	19.0	3.6	3.9	2.5	4.3	1.8	1.6	2.6	22.1
29	2.5	......	8.6	17.8	3.5	3.6	2.4	3.8	1.7	1.5	2.5	21.3
30	2.55	......	6.9	17.4	3.3	3.3	2.3	2.9	1.6	1.4	2.2	24.0
31	2.6	......	6.4	......	3.1	......	2.2	2.6	......	1.3	......	25.0

Daily discharge, in second-feet, of Yalobusha River at Grenada, Miss., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,900	316	9,710	1,260	5,760	388	388	250	282	145	110	203
2	8,260	316	9,260	1,080	4,550	361	428	234	282	133	133	173
3	11,700	316	7,420	970	3,240	361	448	250	266	110	145	158
4	11,700	388	7,280	11,900	2,100	343	468	282	298	110	173	145
5	11,700	408	6,900	12,500	825	334	531	334	352	99	203	133
6	11,300	408	6,390	14,100	625	307	531	334	388	88	218	133
7	10,400	408	5,830	11,000	554	290	554	370	428	78	218	110
8	9,170	408	5,140	13,800	508	290	554	334	488	68	250	99
9	8,580	4,740	4,490	15,000	488	274	531	316	531	54	266	83
10	8,020	5,970	3,590	14,500	448	266	508	282	554	50	218	83
11	7,280	5,830	2,750	13,900	408	250	488	266	600	78	203	218
12	5,900	6,320	1,460	12,900	388	242	448	250	508	99	188	468
13	3,350	5,970	725	12,100	361	234	388	266	468	110	188	910
14	1,780	5,620	577	10,900	361	210	352	298	428	110	218	2,800
15	1,090	5,480	531	11,100	343	188	408	316	408	121	250	10,500
16	675	4,490	488	11,400	325	158	428	468	370	133	266	11,300
17	488	4,190	370	11,700	307	145	448	600	352	158	282	11,500
18	388	4,130	352	11,500	298	127	468	775	352	218	316	12,100
19	352	3,590	700	14,900	361	116	448	1,060	334	234	334	13,600
20	343	2,960	675	16,600	379	116	428	1,820	316	250	370	11,900
21	334	2,260	625	16,700	600	139	388	2,860	298	282	388	9,910
22	325	1,660	577	17,000	940	158	408	3,530	266	298	428	8,900
23	316	1,460	531	16,000	1,860	180	370	2,700	250	282	468	8,660
24	316	1,360	468	14,200	2,550	234	352	2,300	250	266	468	8,260
25	316	1,320	428	12,900	1,700	361	352	1,900	234	250	448	8,100
26	307	1,290	1,120	11,800	910	388	334	1,430	218	218	388	8,020
27	307	8,820	3,240	10,500	508	468	334	970	203	188	352	13,500
28	298	8,820	2,500	8,900	508	577	298	675	188	158	316	12,200
29	298	....	2,140	7,950	488	508	282	554	173	145	298	11,300
30	307	....	1,460	7,650	448	448	266	370	158	133	250	14,900
31	316	....	1,290	....	408	....	250	316	....	121	....	16,400

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Yalobusha River at Grenada, Miss., for 1911.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	11,700	298	3,930	B.
February	8,820	316	3,190	B.
March	9,710	352	2,870	B.
April	17,000	970	11,500	B.
May	5,760	298	1,080	B.
June	577	116	282	B.
July	554	250	415	B.
August	3,530	234	845	B.
September	600	158	341	B.
October	298	50	154	C.
November	468	110	278	B.
December	16,400	83	6,850	B.
The year	17,000	50	2,600	

SUNFLOWER RIVER NEAR RULEVILLE, MISS.

Location.—At the new iron wagon bridge 3 miles southwest of Ruleville; just below the point at which Dougherty Bayou connects with the river.

Records available.—January 1, 1909, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical timber in two sections, set on sea level datum; datum unchanged.

Channel.—Very sluggish current at low stage, and surface height is greatly affected by the stage of Mississippi River.

Discharge measurements.—Made from the wagon bridge.

Floods.—The flood of April 21, 1911, reached a height of 117.5 feet above the gage zero.

Winter flow.—Ice does not affect the flow.

Accuracy.—No discharge estimates have been made.

Cooperation.—Station maintained in cooperation with the Tallahatchie Drainage Commission.

Discharge measurements of Sunflower River near Ruleville, Miss., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 16	R. E. Robertson	97.58	170
16	.....do	97.58	182

Daily gage height, in feet, of Sunflower River near Ruleville, Miss., for 1911.

[W. E. McMathe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	97.0	97.0	99.8	99.1	105.45	98.0	99.28	99.0	99.45	97.0	97.0	97.0
2	97.45	97.0	99.35	98.6	104.6	98.0	99.18	100.3	99.4	97.0	97.0	97.0
3	97.95	97.0	98.9	98.1	104.15	98.0	99.05	101.6	99.3	97.0	97.0	97.0
4	98.38	97.0	98.52	102.5	103.15	98.0	98.92	102.75	99.2	97.0	97.0	97.0
5	98.5	97.45	98.38	112.25	102.65	98.0	98.82	103.5	99.05	97.0	97.0	97.0
6	98.42	98.15	98.28	115.38	102.15	98.0	98.72	103.6	98.5	97.0	97.0	97.0
7	98.35	98.6	98.18	116.0	101.55	98.0	98.62	103.0	98.3	97.0	97.0	97.0
8	98.32	99.65	98.05	115.55	100.65	98.0	98.52	102.3	98.2	97.0	97.0	97.0
9	98.22	100.5	98.0	114.5	100.1	98.0	98.42	101.65	98.2	97.0	97.0	97.0
10	98.12	102.0	98.0	113.05	99.85	98.0	98.32	101.0	98.1	97.0	97.0	97.3
11	97.98	103.25	98.0	112.1	99.72	98.0	98.22	100.2	98.1	97.0	97.0	100.05
12	97.88	104.3	98.0	110.75	99.62	98.0	98.12	99.65	97.9	97.0	97.0	101.8
13	97.78	104.6	98.0	109.45	99.52	98.0	98.0	99.5	97.9	97.0	97.0	104.0
14	97.55	103.9	98.0	108.6	99.42	98.0	98.0	99.68	97.9	97.0	97.0	105.85
15	97.42	102.75	98.0	108.82	99.32	98.0	98.0	99.85	97.85	97.0	97.0	108.15
16	97.32	101.75	98.0	109.58	99.22	98.0	98.0	100.15	97.8	97.0	97.0	112.0
17	97.22	100.9	98.0	110.10	99.12	98.0	98.0	100.85	97.7	97.0	97.0	113.55
18	97.12	100.8	98.0	110.90	98.98	98.0	98.0	101.4	97.7	97.0	97.0	113.5
19	97.0	100.82	98.0	113.8	98.88	98.0	98.0	101.5	97.7	97.0	97.0	112.75
20	97.0	100.92	98.0	116.68	98.78	98.0	98.0	101.15	97.65	97.0	97.0	111.75
21	97.0	100.95	98.0	117.5	98.68	98.0	98.0	101.7	97.6	97.0	97.0	110.75
22	97.0	100.88	98.0	116.7	98.58	98.12	98.0	100.8	97.52	97.0	97.0	109.35
23	97.0	100.7	98.0	115.5	98.48	98.22	98.0	100.2	97.48	97.0	97.0	108.05
24	97.0	100.28	98.0	113.75	98.38	98.32	98.0	100.45	97.38	97.0	97.0	107.45
25	97.0	99.4	98.15	112.1	98.28	98.45	98.0	100.5	97.28	97.0	97.0	107.4
26	97.0	99.0	99.15	110.0	98.18	98.7	98.0	100.5	97.18	97.0	97.0	109.3
27	97.0	99.4	100.25	108.2	98.05	99.12	98.0	100.3	97.05	97.0	97.0	114.3
28	97.0	99.65	101.15	107.8	98.0	99.45	98.0	100.2	97.0	97.0	97.0	115.0
29	97.0	....	101.3	107.8	98.0	99.5	98.0	100.2	97.0	97.0	97.0	114.7
30	97.0	....	100.85	106.6	98.0	99.4	98.0	100.05	97.0	97.0	97.0	115.0
31	97.0	....	100.25	....	98.0	....	98.15	99.7	....	97.0	....	116.9

SUNFLOWER RIVER AT BAIRD, MISS.

Location.—At the Southern Railway bridge at Baird, Miss., about 4 miles below the Mouth of Quiver River.

Records available.—September 3, 1908, to December 31, 1911. Also from records of United States Engineers, March 15 to July 25, 1908.

Drainage area.—Not measured.

Gage.—Vertical timber set on sea-level datum; datum unchanged.

Discharge measurements.—Made from the Southern Railway bridge.

Floods.—The flood of June 3, 1909, reached a height of 104.4 feet above the gage datum.

Winter flow.—Ice does not affect the flow.

Accuracy.—Water surface height is greatly affected by the stage of Mississippi River. There is no fixed relation between the gage height and discharge. No discharge estimates have been made.

Cooperation.—Station maintained in cooperation with the Tallahatchie Drainage Commission.

Discharge measurements of Sunflower River at Baird, Miss., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 22	R. E. Robertson	87.16	1,350
Nov. 17	do	82.60	335

Daily gage height, in feet, of Sunflower River at Baird, Miss., for 1911.

[H. V. Finch, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	83.8	83.0	93.0	88.0	98.5	88.0	84.7	83.0	85.8	82.7	82.5	82.5
2	85.5	83.0	93.5	87.8	98.0	87.0	84.5	83.0	85.5	82.7	82.5	82.5
3	86.5	83.0	93.6	87.8	97.3	86.4	84.2	83.2	85.3	82.7	82.5	82.5
4	87.1	83.0	93.5	87.8	96.9	85.4	84.0	84.2	84.8	82.7	82.5	82.5
5	87.1	83.1	93.1	91.3	96.5	84.5	83.7	85.8	84.5	82.7	82.5	82.5
6	87.0	83.1	92.4	95.8	96.0	84.0	83.5	86.3	84.3	82.6	82.5	82.5
7	86.5	83.1	91.6	98.0	95.7	83.8	83.3	86.4	84.0	82.6	82.5	82.5
8	86.1	83.2	91.0	99.0	95.5	83.5	83.3	86.2	83.8	82.6	82.6	82.5
9	85.6	84.2	89.9	100.0	95.3	83.4	83.2	85.7	83.6	82.6	82.6	82.5
10	85.3	86.0	89.5	100.5	95.1	83.3	83.1	85.5	83.5	82.6	82.6	82.5
11	84.8	88.0	88.6	100.5	95.0	83.2	83.1	84.8	83.5	82.6	82.5	86.0
12	84.6	89.5	88.0	100.5	94.8	83.1	83.0	84.3	83.5	82.7	82.5	89.0
13	84.4	90.4	87.4	100.5	94.7	83.0	83.7	84.2	83.4	82.8	82.5	92.0
14	84.2	90.8	86.8	100.5	94.6	83.0	83.7	84.0	83.3	82.8	82.5	95.0
15	84.0	91.1	86.3	99.5	94.5	83.0	84.0	83.8	83.2	82.8	82.6	98.0
16	83.8	91.1	85.6	99.0	94.1	83.0	83.7	83.6	83.1	82.8	82.6	101.0
17	83.6	90.9	85.3	98.9	94.0	83.0	83.6	84.7	83.1	82.8	82.5	102.5
18	83.5	90.4	85.0	99.0	93.7	83.0	83.5	85.0	83.1	82.7	82.5	103.0
19	83.4	89.3	84.7	100.0	93.6	83.0	83.4	85.9	83.1	82.7	82.5	103.0
20	83.3	89.3	84.6	101.5	93.4	83.0	83.3	87.7	83.0	82.7	82.5	102.9
21	83.2	89.2	84.5	102.5	93.2	83.0	83.3	87.7	83.0	82.6	82.5	102.5
22	83.1	88.5	84.5	103.0	93.1	83.4	83.3	87.2	83.0	82.6	82.5	102.0
23	83.1	88.0	84.3	103.0	93.0	83.8	83.2	87.0	83.0	82.6	82.5	101.8
24	83.0	87.5	84.1	102.5	92.7	83.7	83.2	87.0	83.0	82.6	82.5	101.5
25	83.0	87.3	84.0	102.0	92.4	84.6	83.5	86.7	83.0	82.6	82.5	101.5
26	83.0	87.1	85.0	101.0	92.1	84.9	83.4	86.5	82.9	82.6	82.6	102.0
27	83.0	89.5	86.6	100.5	91.8	84.9	83.3	86.5	82.9	82.6	82.6	104.0
28	83.0	92.0	87.8	100.0	91.3	86.0	83.2	86.4	82.8	82.6	82.6	105.0
29	83.0	......	87.9	99.5	90.5	85.5	83.2	86.3	82.7	82.6	82.5	105.5
30	83.0	......	88.8	99.0	90.0	85.0	83.1	86.2	82.7	82.6	82.5	106.0
31	83.0	......	88.6	......	89.0	......	83.1	86.1	......	82.6	......	107.0

RED RIVER BASIN.

RED RIVER AT ARTHUR CITY, TEX.

Location.—At a bridge at Arthur City, Tex.

Records available.—January 1, 1905, to December 31, 1911. The United States Weather Bureau has maintained a gaging station at this point since 1891.

Drainage area.—Not measured.

Gage.—Vertical staff, fastened to one of the piers of the bridge.

Channel.—Composed of sand; shifting.

Discharge measurements.—Made from the bridge.

Winter flow.—Ice does not affect the flow.

Accuracy.—The accuracy is uncertain. Discharge measurements made in 1905-6 indicate a shifting channel. One measurement made in 1911 checks the mean curve drawn through the previous measurement. No measurement made during 1907-1910. The rating table, used to work up the records, is the one published in Water Supply Paper 209, page 51, extended down to a gage height of 4.7 feet. Daily discharges are not published because of their unreliability, but the monthly values are considered fair.

Cooperation.—Gage-height record furnished by the United States Weather Bureau.

The following discharge measurement was made at this station by T. U. Taylor: December 28, 1911, gage height, 11.0 feet; discharge, 9,500 second-feet.

Daily gage height, in feet, of Red River at Arthur City, Tex., for 1907-1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.5	9.5	11.0	7.9	10.0	20.0	13.0	7.7	7.8	5.9	7.8	10.4
2	7.7	9.4	10.8	7.9	10.5	21.0	12.7	7.6	7.5	5.7	7.9	8.9
3	8.5	9.0	9.8	7.8	10.5	19.5	11.5	7.6	7.1	5.9	......	......
4	9.1	8.8	9.4	7.7	9.3	17.0	11.1	8.5	6.9	......	......	8.0
5	9.3	8.7	9.0	7.6	8.9	14.7	10.5	10.6	6.8	......	......	7.9
6	9.2	8.7	8.6	8.8	7.9	13.7	9.8	9.8	6.6	17.0	9.8	7.9
7	9.0	8.5	8.5	10.5	10.5	13.0	10.0	9.5	6.4	17.6	9.5	7.5
8	8.8	8.4	8.2	10.6	12.5	12.6	10.8	9.5	6.2	......	9.0	......
9	8.6	8.3	8.2	8.5	14.5	13.5	10.0	9.8	6.0	14.0	8.5	7.6
10	8.7	8.2	12.8	8.4	14.0	12.4	10.3	10.0	6.1	......	......	......
11	11.0	8.2	14.9	8.3	14.0	12.8	10.9	9.4	6.0	10.8	8.0	7.4
12	12.0	8.2	15.0	8.0	14.0	11.9	20.8	8.8	6.0	10.6	8.7	7.5
13	12.0	8.1	16.0	7.8	12.4	16.5	16.8	8.5	6.2	10.0	......	8.0
14	12.0	8.0	14.7	7.5	11.3	15.3	14.8	8.0	5.8	......	......	11.9
15	12.4	7.8	14.5	7.4	10.5	13.0	15.2	7.8	6.2	......	7.6	......
16	11.0	7.7	12.0	7.2	10.8	12.3	14.3	7.6	6.1	......	......	10.0
17	10.2	7.7	11.3	7.1	10.7	12.3	12.7	7.5	5.9	9.6	......	9.7
18	9.8	7.6	11.6	7.0	9.8	11.6	12.0	7.3	6.0	9.0	7.5	8.8
19	9.6	7.6	10.0	7.0	9.1	11.1	11.3	7.1	6.0	8.9	......	8.0
20	9.7	7.6	9.7	7.0	9.0	10.8	10.4	7.0	6.0	......	......	7.8
21	9.7	7.5	9.4	6.9	8.6	10.5	10.0	6.8	5.9	8.4	......	7.6
22	9.6	7.5	9.1	6.9	8.3	10.5	9.6	6.9	5.8	8.1	......	......
23	9.8	7.5	8.8	6.9	8.1	13.9	9.2	6.8	5.7	8.0	9.0	16.0
24	11.3	7.5	8.6	6.9	8.3	13.6	8.9	7.3	5.8	7.9	......	14.0
25	11.5	7.5	8.5	6.8	11.0	14.3	8.6	7.2	7.0	7.7	......	......
26	10.5	7.7	8.3	6.7	15.6	15.6	8.4	7.4	6.8	7.6	7.8	13.6
27	9.9	7.5	8.2	6.7	21.4	13.5	8.3	6.8	6.6	7.5	7.7	12.0
28	9.6	9.3	8.0	7.7	23.0	12.6	8.2	6.5	6.5	......	......	11.0
29	9.5	......	7.9	7.8	19.0	12.0	8.0	6.4	6.2	......	7.8	......
30	9.5	......	7.9	9.4	16.5	13.0	7.9	6.2	6.0	8.0	10.7	10.0
31	9.5	......	7.9	......	19.0	......	7.8	7.0	......	7.7	......	9.6

Daily gage height, in feet, of Red River at Arthur City, Tex., for 1907-1911—**Contd.**

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	9.7	7.9	10.0	15.6	12.0	25.5	15.3	9.7	7.8	8.3	10.4	14.5
2	9.0	7.8	9.6	14.0	11.5	27.0	15.7	10.8	7.9	7.9	10.1	19.5
3	9.0	7.8	9.6	14.4	10.6	26.6	18.8	10.1	7.6	7.6	....	18.5
4	9.6	8.0	9.4	15.0	10.2	29.4	17.8	10.4	7.7	8.2	8.8	17.0
5	11.0	7.6	9.0	16.6	10.0	30.0	19.5	9.4	7.8	8.3	9.0	15.0
6	13.0	7.5	9.0	14.6	9.9	32.0	19.3	8.9	7.3	7.8	8.6	14.0
7	12.4	7.4	9.0	14.6	11.0	32.1	15.6	8.5	7.2	7.4	8.1	13.5
8	12.0	7.4	9.0	13.6	10.5	30.8	13.6	8.5	7.0	7.2	7.8	12.0
9	11.8	7.6	9.4	15.0	9.6	29.1	11.6	8.3	6.7	7.1	7.5	11.3
10	11.6	7.8	14.0	18.0	9.1	27.1	11.5	8.0	6.5	7.0	7.4	11.0
11	12.4	8.7	13.6	18.0	8.7	28.0	11.0	7.7	6.6	6.7	7.1	10.9
12	10.4	10.7	13.0	22.0	9.5	27.8	10.8	7.5	7.5	6.5	7.0	10.7
13	10.0	14.7	12.6	20.5	18.0	25.8	10.6	7.4	6.9	6.7	6.9	10.4
14	9.6	14.4	12.0	19.5	21.0	24.3	11.6	7.3	6.7	6.4	6.8	9.7
15	9.4	14.2	11.0	20.2	19.0	23.3	11.0	7.2	6.6	7.0	6.7	9.2
16	9.0	13.7	10.0	18.8	18.6	27.5	10.7	7.0	6.4	7.5	6.7	8.9
17	8.8	12.7	9.6	17.8	18.5	27.5	10.5	6.9	6.3	7.3	6.6	8.8
18	8.7	11.7	9.0	17.1	17.7	26.0	10.7	6.8	6.4	7.4	6.8	8.7
19	8.2	10.7	8.8	18.0	17.6	27.0	10.9	6.7	6.7	7.1	6.7	8.5
20	8.0	10.0	8.7	18.5	17.5	28.6	13.0	6.8	6.9	6.9	6.8	8.4
21	7.8	9.6	8.4	17.7	18.5	27.2	13.6	6.6	6.6	6.7	6.9	8.3
22	7.6	9.2	8.4	19.0	17.0	24.5	11.0	6.7	6.4	8.4	6.7	8.2
23	7.5	9.2	8.4	17.5	16.0	22.6	10.5	6.6	6.5	17.5	6.8	8.1
24	7.4	9.0	8.1	16.8	15.9	20.2	11.4	6.6	7.3	18.4	6.7	8.0
25	7.6	9.4	7.8	18.2	24.4	18.2	13.5	6.8	7.1	18.7	6.8	7.9
26	7.6	10.0	7.8	16.2	29.0	16.2	12.0	7.8	6.9	18.5	9.2	7.8
27	7.6	11.0	7.6	14.5	36.5	15.2	13.0	7.7	7.0	16.5	9.7	7.7
28	7.6	10.7	7.8	13.8	42.7	16.0	12.8	7.2	7.8	15.0	8.7	7.6
29	7.4	10.1	11.8	13.2	41.3	16.4	11.8	6.9	9.3	14.5	8.2	7.5
30	7.4	....	16.8	12.6	34.5	15.2	10.6	6.8	9.1	13.2	11.0	7.6
31	7.6	....	18.0	....	28.5	....	9.9	7.3	....	12.0	....	7.7
1909.												
1	7.6	6.9	6.3	6.5	8.5	8.3	11.7	5.9	6.2	4.8	4.8	6.5
2	7.5	6.8	6.3	6.4	7.4	8.3	10.7	5.9	6.0	4.8	4.8	6.4
3	7.4	6.7	6.2	6.9	7.2	9.2	10.2	6.0	6.0	4.7	4.8	15.8
4	7.3	6.6	6.2	7.1	6.8	8.7	9.4	5.8	6.0	4.6	4.8	14.3
5	7.2	6.7	6.2	6.8	6.7	7.5	9.0	5.6	5.9	4.6	4.8	13.9
6	7.1	6.7	6.1	6.6	6.8	7.3	8.5	5.6	5.7	4.6	4.8	13.2
7	7.0	6.8	6.1	6.7	6.7	6.8	8.1	5.5	5.6	4.6	4.8	12.4
8	7.0	6.6	6.1	6.8	6.6	6.7	7.7	5.5	5.6	4.6	4.8	11.8
9	6.9	6.5	6.3	6.5	6.0	6.7	7.6	5.5	5.6	4.8	4.9	10.8
10	6.8	6.5	6.5	7.0	5.8	6.4	7.4	5.6	5.4	4.6	4.9	10.2
11	6.7	6.5	6.8	7.1	5.9	6.2	7.3	5.4	5.2	4.6	8.0	9.8
12	6.7	6.4	6.8	7.2	5.8	7.0	7.2	5.4	5.0	4.6	8.0	9.4
13	6.7	6.4	6.7	7.0	6.5	8.1	7.0	5.2	5.0	4.6	7.6	9.0
14	6.8	6.5	6.5	6.7	6.4	13.2	6.9	5.2	4.9	4.6	6.3	8.9
15	6.9	6.4	6.3	6.5	6.0	13.8	6.7	5.2	4.9	4.5	6.0	8.3
16	7.0	6.4	6.3	6.3	5.8	12.5	6.6	5.2	4.9	4.5	5.9	7.9
17	7.0	6.5	6.2	6.3	5.8	11.7	6.7	5.2	4.9	4.5	7.0	7.7
18	6.9	6.5	6.2	6.0	6.2	15.0	6.7	5.2	4.8	4.5	8.2	7.5
19	6.8	6.5	6.1	5.9	7.0	13.8	6.4	5.2	4.8	4.5	8.3	7.2
20	6.8	6.5	6.8	5.8	9.8	12.7	6.4	5.2	4.8	4.6	8.3	7.0
21	6.9	6.7	6.8	6.2	9.4	11.7	6.3	7.5	4.8	4.5	8.3	6.9
22	7.0	6.5	6.8	6.2	8.7	10.7	6.3	7.2	4.6	4.5	8.9	6.8
23	7.0	6.7	6.9	8.1	8.7	10.0	6.3	7.0	4.6	4.5	8.5	6.8
24	7.1	6.8	6.9	7.5	7.7	9.3	6.3	7.5	4.6	4.5	8.0	6.8
25	7.0	7.0	6.6	6.6	6.9	9.0	6.3	7.5	5.2	5.4	7.8	6.4
26	7.1	6.5	7.7	6.3	8.4	9.0	6.1	6.3	5.4	5.4	7.6	6.0
27	7.2	6.4	7.6	6.2	9.8	8.7	6.0	6.2	5.6	5.3	7.6	7.0
28	7.1	6.4	7.5	7.3	10.2	15.3	6.0	6.2	5.0	5.2	7.3	7.1
29	7.1	....	7.2	8.5	10.3	13.1	6.0	6.2	5.0	5.1	6.9	7.0
30	7.1	....	6.9	8.7	10.2	12.2	6.0	6.0	4.8	5.0	6.5	7.0
31	7.0	....	6.7	....	9.2	....	6.0	6.0	....	4.8	....	7.0

Daily gage height, in feet, of Red River at Arthur City, Tex., for 1907-1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	7.0	6.9	6.2	6.0	7.4	10.0	6.6	6.4	6.5	5.4	5.0	5.0
2	7.0	6.9	6.2	6.0	7.0	10.0	6.6	6.3	6.5	5.4	5.0	5.0
3	7.0	6.9	6.2	7.0	7.0	10.0	6.6	6.3	6.5	5.4	5.8	5.0
4	7.0	6.9	6.2	9.0	7.0	10.0	6.6	6.3	6.0	5.4	5.8	5.0
5	7.0	6.9	6.2	9.0	6.9	9.6	6.6	6.0	6.0	5.4	5.2	5.0
6	7.0	6.9	6.2	9.0	6.9	9.0	6.6	6.0	6.0	5.4	5.2	5.0
7	7.0	6.9	6.2	8.5	6.6	8.0	6.6	6.0	5.8	5.4	5.0	5.0
8	7.0	6.9	6.2	8.0	6.6	8.6	6.6	6.0	5.8	5.4	5.0	5.0
9	7.0	6.9	6.2	7.9	6.6	8.0	6.6	6.0	5.8	5.4	5.0	5.0
10	7.0	6.9	6.2	7.0	6.4	8.0	6.6	6.4	5.8	5.4	5.4	5.0
11	7.0	6.9	6.2	6.9	6.4	8.0	6.6	8.0	5.8	5.4	5.2	5.0
12	7.0	6.9	6.2	7.5	6.3	7.9	6.6	8.9	5.8	5.4	5.0	5.0
13	7.0	6.9	6.2	10.0	6.3	7.9	6.6	8.8	5.8	5.4	5.0	5.1
14	7.0	6.7	6.2	11.6	6.3	7.9	8.6	8.2	5.8	5.4	5.0	5.0
15	7.0	6.6	6.2	10.0	6.3	7.9	10.6	8.1	5.6	5.4	5.0	5.0
16	6.9	6.5	6.2	10.0	6.1	7.6	13.6	7.6	5.6	5.4	5.0	5.0
17	6.9	6.5	6.2	12.2	6.4	7.6	11.6	7.3	5.6	5.4	5.0	5.0
18	6.9	6.5	6.2	11.0	8.0	7.6	10.6	6.9	5.6	5.4	5.0	5.0
19	6.9	6.5	6.2	11.0	9.0	7.6	10.0	6.4	5.6	5.4	5.0	5.0
20	6.9	6.5	6.2	10.9	9.3	7.6	10.0	6.7	5.6	5.2	5.0	5.0
21	6.9	6.3	6.2	9.6	8.6	7.0	9.0	6.4	5.6	5.2	5.0	5.0
22	6.9	6.3	6.2	9.0	8.0	7.0	8.9	7.0	5.6	5.0	5.0	5.0
23	6.9	6.3	6.0	8.6	7.6	7.0	8.6	7.0	5.6	5.0	5.0	5.0
24	6.9	6.3	6.0	8.6	7.0	7.0	8.0	7.0	5.6	5.0	5.0	5.0
25	6.9	6.3	6.0	8.6	12.0	7.0	7.8	7.0	5.6	5.0	5.0	5.0
26	6.9	6.3	6.0	8.5	12.0	7.0	7.4	7.0	5.4	5.0	5.0	5.0
27	6.9	6.3	6.0	8.5	11.6	7.0	7.0	6.5	5.4	5.0	5.0	5.0
28	6.9	6.3	6.0	8.4	11.6	7.0	6.8	6.5	5.4	5.0	5.0	5.0
29	6.9	......	6.0	7.9	11.0	7.0	6.7	6.5	5.4	5.0	5.0	5.0
30	6.9	......	6.0	7.6	9.6	6.6	6.6	6.5	5.4	5.0	5.0	5.0
31	6.9	......	6.0	......	9.6	......	6.5	6.5	......	5.0	......	5.0
1911.												
1	5.0	5.0	8.3	5.5	5.5	6.0	5.4	10.5	13.4	7.0	6.0	6.0
2	5.0	5.0	8.0	5.5	5.5	6.0	5.4	9.8	13.0	7.0	6.0	6.0
3	5.0	5.0	7.8	5.5	5.5	5.8	5.4	9.4	11.0	6.8	6.0	6.0
4	4.8	5.0	7.6	5.3	5.5	11.5	5.2	9.0	10.0	6.6	6.0	6.0
5	4.8	5.0	7.4	5.3	5.5	10.0	5.0	8.2	10.0	6.5	6.0	6.0
6	4.7	5.0	7.0	5.3	6.0	9.3	5.0	7.5	9.5	6.4	6.0	6.0
7	4.7	5.0	6.8	5.3	6.4	9.0	5.0	7.0	9.0	6.3	6.0	6.0
8	4.7	5.1	6.6	5.2	6.6	8.7	5.0	6.6	8.6	6.3	6.0	6.0
9	4.7	5.0	6.6	5.2	6.0	8.5	5.0	6.2	9.5	6.3	6.0	6.0
10	4.9	5.0	6.4	5.2	6.0	8.3	5.5	6.0	9.8	6.0	6.0	6.0
11	5.0	5.0	6.2	5.2	6.0	8.0	5.2	6.0	11.3	5.8	6.0	6.0
12	5.0	5.0	6.0	5.2	6.0	8.0	5.0	6.0	11.3	5.8	6.0	5.9
13	5.0	5.0	6.0	5.0	5.6	8.0	5.0	6.0	10.5	5.8	6.0	5.8
14	5.0	5.0	6.0	5.0	5.5	7.8	5.0	6.4	10.0	5.8	6.0	12.0
15	5.0	5.0	5.9	6.9	5.5	7.6	5.0	6.3	11.5	6.0	6.0	11.0
16	5.0	5.0	5.8	10.0	5.3	7.4	5.5	8.0	10.5	6.0	6.0	9.0
17	5.0	5.0	5.8	10.7	5.2	7.2	5.5	8.0	9.5	6.0	6.0	9.0
18	5.0	8.0	5.8	9.8	5.2	7.0	5.5	8.0	9.3	6.4	6.0	9.0
19	5.0	7.6	5.8	8.9	5.2	7.0	6.5	8.5	8.8	6.6	6.0	8.9
20	5.0	7.0	5.8	8.5	6.0	7.0	9.0	8.3	8.5	6.6	6.0	9.9
21	5.0	8.8	5.8	8.0	8.0	7.0	9.0	8.3	8.3	6.6	6.0	9.5
22	5.0	7.8	5.8	7.7	9.0	6.8	9.0	7.0	8.0	6.6	6.0	9.0
23	5.0	11.6	5.8	7.5	9.5	6.3	11.8	6.5	7.6	6.4	6.2	8.6
24	5.0	10.6	5.8	7.0	8.5	5.7	16.0	6.0	7.3	6.2	6.0	15.0
25	5.0	9.6	5.8	7.5	8.3	5.5	16.0	7.0	7.0	6.0	6.0	14.0
26	5.0	8.9	5.8	7.7	7.5	5.5	14.4	6.8	7.0	6.0	6.0	14.9
27	5.0	8.9	5.7	6.6	6.5	5.5	13.5	6.5	6.8	6.0	6.0	11.0
28	5.0	8.5	5.6	6.0	6.5	5.4	11.4	7.0	7.0	6.0	6.0	10.5
29	5.0	......	5.5	5.8	6.3	5.4	10.8	7.8	7.0	6.0	6.0	9.9
30	5.0	......	5.5	5.6	6.0	5.4	10.2	11.4	7.0	6.0	6.0	9.0
31	5.0	......	5.5	......	6.0	......	11.0	13.0	......	6.0	......	10.6

Monthly discharge of Red River at Arthur City, Tex., for 1907–1911.

[Drainage area, 40,200 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1907.						
January	13,000	3,480	7,360	0.183	0.21	453,000
February	6,630	3,480	4,300	.107	.11	239,000
March	24,800	4,010	8,140	.202	.23	501,000
April	8,750	2,580	3,870	.096	.11	230,000
May	55,200	4,300	12,700	.316	.36	781,000
June	45,900	8,540	17,000	.423	.47	1,010,000
July	45,000	3,870	9,820	.244	.28	604,000
August	8,750	2,100	4,010	.100	.12	247,000
September	3,870	1,710	2,200	.055	.06	131,000
October	31,100	1,710	6,270	.156	.18	386,000
November	8,960	3,480	4,920	.122	.14	293,000
December	24,800	3,360	6,810	.169	.19	419,000
The year	55,200	1,710	7,280	.181	2.46	5,290,000
1908.						
January	14,600	3,360	6,090	.151	.17	374,000
February	20,000	3,360	7,360	.183	.20	423,000
March	32,800	3,610	7,940	.198	.23	488,000
April	50,500	13,500	27,500	.684	.76	1,640,000
May	155,000	5,240	34,900	.868	1.00	2,150,000
June	101,000	21,800	64,400	1.60	1.78	3,830,000
July	39,200	7,360	14,300	.356	.41	879,000
August	9,170	2,480	3,870	.096	.11	238,000
September	6,270	2,200	3,120	.078	.09	186,000
October	35,700	2,290	7,360	.183	.21	453,000
November	9,600	2,480	3,870	.096	.11	230,000
December	39,200	3,480	8,540	.212	.24	525,000
The year	155,000	2,200	15,800	.393	5.31	11,400,000
1909.						
January	3,610	2,580	2,900	.072	.08	178,000
February	2,900	2,290	2,480	.062	.06	138,000
March	3,740	2,020	2,480	.062	.07	152,000
April	5,240	2,100	2,680	.067	.07	159,000
May	8,140	1,790	3,480	.087	.10	214,000
June	22,200	2,100	7,550	.188	.21	449,000
July	11,200	1,950	3,240	.081	.09	199,000
August	3,480	1,360	1,870	.046	.05	115,000
September	2,100	1,070	1,360	.034	.04	80,900
October	1,500	1,030	1,110	.028	.03	68,200
November	5,580	1,150	2,480	.062	.07	148,000
December	24,000	1,950	5,410	.135	.16	333,000
The year	24,000	1,030	3,090	.077	1.03	2,230,000
1910.						
January	2,900	2,790	2,840	.071	.08	175,000
February	2,790	2,200	2,480	.062	.06	138,000
March	2,100	1,950	2,020	.050	.06	124,000
April	12,400	1,950	5,410	.135	.15	322,000
May	11,900	2,020	4,300	.107	.12	264,000
June	7,550	2,480	4,010	.100	.11	239,000
July	16,400	2,380	4,010	.100	.12	247,000
August	5,580	1,950	2,790	.069	.08	172,000
September	2,380	1,500	1,790	.044	.05	107,000
October	1,500	1,220	1,430	.036	.04	87,900
November	1,790	1,220	1,290	.032	.04	76,800
December	1,290	1,220	1,220	.030	.03	75,000
The year	16,400	1,220	2,800	.070	.94	2,030,000
1911.						
January	1,220	1,040	1,190	.030	.03	73,200
February	11,000	1,220	2,980	.074	.08	166,000
March	4,600	1,570	2,260	.056	.06	139,000
April	8,960	1,220	2,870	.071	.08	171,000
May	6,630	1,360	2,420	.060	.07	149,000
June	10,700	1,500	3,480	.087	.10	207,000
July	24,800	1,220	5,720	.142	.16	352,000
August	14,600	1,950	4,170	.104	.12	256,000
September	15,800	2,680	6,610	.164	.18	393,000
October	2,900	1,790	2,180	.054	.06	134,000
November	2,110	1,950	1,960	.049	.05	117,000
December	21,000	1,790	6,240	.155	.18	384,000
The year	24,800	1,040	3,510	.087	1.17	2,540,000

NOTE.—These records are considered only fair on account of the lack of discharge measurements and the shifting character of the stream bed.

WICHITA RIVER AT WICHITA FALLS, TEX.

Location.—At the Fort Worth & Denver City Railway bridge at Wichita Falls, Tex.

Records available.—October 1, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Standard chain gage fastened to the bridge.

Channel.—Bottom of stream is sandy and shifting.

Discharge measurements.—Made from the bridge or by wading.

Accuracy.—No discharge estimates have been made.

Cooperation.—Station maintained in cooperation with the chief engineer of the Wichita Falls & Northwestern Railway.

Discharge measurements of Wichita River at Wichita Falls, Tex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 14	E. F. Mittmann	3.5	525
30	....do	8.3	3,510

Daily gage height, in feet, of Wichita River at Wichita Falls, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.2	0.9	1.0	0.8	1.3	1.1	0.4	2.0	3.9	0.9	0.5	0.4
2	1.2	.9	.9	.8	1.2	1.1	.3	1.9	3.2	.8	.5	.4
3	1.2	.9	.9	.8	1.1	1.0	.5	1.8	2.9	.8	.5	.4
4	1.1	.8	.9	.8	1.0	1.0	.5	1.8	2.5	.8	.5	.4
5	1.1	.8	.9	.8	1.0	1.0	.5	1.8	2.2	.8	.5	.4
6	1.1	.8	.8	.8	.9	.9	.5	1.7	2.0	.8	.5	.4
7	1.1	.8	.8	.8	.9	.9	.5	1.7	1.8	.8	.5	.4
8	1.0	.8	.8	.8	.8	.9	.6	1.7	2.9	.7	.5	.4
9	1.0	.8	.8	.8	.8	.9	.6	1.6	2.7	.7	.4	.4
10	1.0	.8	.8	.8	.7	.9	1.6	1.6	2.4	.7	.4	14.2
11	1.2	3.0	.7	.8	.7	.8	2.9	1.6	2.1	.7	.4	7.8
12	1.2	2.8	.7	.8	.7	.8	3.3	1.5	2.7	.7	.4	6.5
13	1.2	2.6	.7	.8	.7	.8	3.4	1.2	2.9	.7	.4	5.6
14	1.2	2.0	.7	.8	11.1	.8	6.0	1.0	2.2	.7	.4	4.7
15	1.1	1.6	1.5	.8	6.5	.8	1.7	.8	2.0	.7	.3	4.0
16	1.1	1.2	1.5	.8	4.9	.7	1.4	.6	2.0	.7	.3	3.2
17	1.1	1.2	1.4	.7	4.5	.7	1.8	.4	2.0	.6	.3	2.6
18	1.1	4.0	1.4	.7	3.9	.7	4.0	.4	1.9	.6	.3	2.0
19	1.0	3.8	1.3	.7	3.3	.7	3.9	.4	1.9	.6	.3	1.7
20	1.0	3.6	1.2	.7	2.8	.7	4.7	.3	1.8	.6	.3	11.3
21	1.0	3.2	1.2	.7	2.2	.7	4.7	.3	1.7	.5	.3	10.8
22	1.0	2.7	1.1	.7	1.9	.7	4.8	.3	1.3	.5	.3	4.8
23	1.0	2.2	1.1	.7	1.7	.7	4.7	.7	1.3	.5	.3	3.3
24	.9	1.7	1.1	.7	1.6	.7	4.2	.9	1.2	.5	.3	2.8
25	.9	1.2	1.0	.7	1.5	.7	3.4	.9	1.2	.5	.3	2.4
26	.9	1.0	1.0	3.2	1.4	.7	2.9	.8	1.1	.5	.3	2.2
27	.9	1.0	.9	2.8	1.3	.6	2.7	4.2	1.0	.5	.3	1.9
28	.9	1.0	.9	2.4	1.3	.6	2.6	13.1	1.0	.5	.3	1.7
29	.9	......	.9	1.8	1.2	.5	2.4	11.0	.9	.5	.3	1.6
30	.9	......	.8	1.7	1.2	.4	2.2	8.3	.9	.5	.3	1.4
31	.9	......	.8	......	1.1	......	2.1	5.4	......	.5	......	1.3

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous measurements were made on streams in the Arkansas River basin in 1911:

Miscellaneous measurements in Arkansas River drainage basin in 1911.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	Sec.-ft.
Dec. 25	Arkansas River	Mississippi River.	Near Leadville, Colo., below confluence of Tennessee Fork and East Arkansas River.		[a] 21.8
Feb. 7	Chalk Creek	Arkansas River	Near Buena Vista, Colo	0.20	17.5
Mar. 10	do	do	do	.23	20.8
Jan. 17	Grape Creek	do	Near Canon City, Colo		4.5
Feb. 20	do	do	do		[b] 2.5
July 8	Fountain Creek	do	Crystola, Colo		0
8	do	do	Green Mountain Falls, Colo		[b] .5
8	do	do	Cascade, Colo		[b] 5.0
8	do	do	2 miles above Manitou, Colo		[b] 8.0
Mar. 9	do	do	Fountain, Colo		[b] 3.0
Dec. 1	do	do	do		[b] 4.0
28	do	do	Butte, Colo		[b] 5.0
Mar. 9	St. Charles River	do	San Carlos, Colo		[b] .2
May 19	do	do	do		[b] .25
Sept. 24	do	do	do		[b] .05
Mar. 9	Huerfano River	do	Huerfano, Colo		[b] 6.0
9	Cucharas River	Huerfano River	Walsenburg, Colo		[b] 3.0
May 19	do	do	do		[b] .5
Sept. 24	do	do	do		0
May 19	Santa Clara Creek	Cucharas River	Monson, Colo		[b] 2.0
Sept. 24	Apishapa Creek	Arkansas River	Lynn, Colo		0
24	Salado Creek	Apishapa Creek	Rugby, Colo		[b] .25
Mar. 9	do	do	Monson, Colo		[b] .7
Nov. 16	Canadian River	Arkansas River	Dillon, N. Mex		[b] .3
July 20	do	do	4 miles south of Raton, N. Mex		[b] 1.50
26	do	do	do		[b] 2.0
Apr. 28	do	do	Near Maxwell, N. Mex		0
Oct. 26	do	do	do		[b] 1.0
Feb. 17	do	do	French, N. Mex		[b] .25
Aug. 20	do	do	do		[b] 1.0
Nov. 4	do	do	do		[b] 7.0
Dec. 13	do	do	do		[b] 3.0
25	do	do	do		[b] 6.0
25	do	do	Near Tucumcari, N. Mex		[b] 30.0
Feb. 18	Raton Creek	Canadian River	Raton, N. Mex		0
July 21	do	do	do	1.32	19.7
24	do	do	do	.70	[b] .1
24	Vermejo Creek	do	Colfax, N. Mex		[b] 150
26	do	do	do		[b] 60
26	do	do	do		[b] 50
Nov. 16	do	do	do		[b] .5
Apr. 28	do	do	Near French, N. Mex		0
Sept. 2	do	do	do		[b] .3
Apr. 28	Cimarron River	do	Springer, N. Mex		[b] 2.0
Aug. 20	do	do	do		[b] 2.0
Oct. 26	do	do	do		[b] 1.5
Nov. 15	do	do	do		[b] 10.0
Nov. 16	Ponil Creek	Cimarron River	Near Cimarron, N. Mex		[b] 5.0
May 9	Urraca Creek	Rayado River	Webster's ranch, near Springer, N. Mex.	.29	1.5
June 11	do	do	do		[b] .5
Nov. 14	Ocate Creek	Canadian River	Near Colmor, N. Mex		[b] .5
Apr. 28	Mora River	do	Watrus, N. Mex		[b] 3.0
Sept. 4	do	do	do		[b] 1.0
Nov. 14	do	do	do		[b] 18.0
Aug. 20	do	do	Near Wagon Mound, N. Mex		[b] .5
3	Pajarito Creek	do	15 miles above Tucumcari, N. Mex.		0
Dec. 23	Vigil Creek	Pajarito Creek	Near Tucumcari, N. Mex		[b] .25
Nov. 5	Tequesquite Creek	Ute Creek	Near Albert, N. Mex., below confluence with Carriso Creek.		0
5	do	do	5 miles below Albert, N. Mex		[b] .12

[a] Ice conditions.

[b] Estimated.

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PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

W. W. FOLLETT, W. B. FREEMAN
AND G. K. LARRISON

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SURFACE WATER SUPPLY OF THE WESTERN GULF OF MEXICO DRAINAGE BASINS, 1911.

By W. W. FOLLETT, W. B. FREEMAN, and G. K. LARRISON.

AUTHORITY FOR INVESTIGATIONS.

This volume is Part VIII of a series of 12 reports presenting results of measurements of flow made on certain streams in the United States during the calendar year 1911. The reports are listed in the following table:

Papers on surface water supply of the United States, 1911.

Part.[a]	No.	Title.
I	301	North Atlantic coast.
II	302	South Atlantic coast and eastern Gulf of Mexico.
III	303	Ohio River basin.
IV	304	St. Lawrence River basin.
V	305	Upper Mississippi River and Hudson Bay basins.
VI	306	Missouri River basin.
VII	307	Lower Mississippi River basin.
VIII	308	Western Gulf of Mexico.
IX	309	Colorado River basin.
X	310	Great Basin.
XI	311	Pacific coast in California.
XII	312	North Pacific coast.

[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394), which contains the following paragraph:

> *Provided*, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation.

Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal year ending June 30:

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work various private and State organizations have cooperated. Acknowledgment for such cooperation is made on page 13, and also in connection with the description of each station affected by the cooperative work.

PUBLICATIONS.

Measurements of stream flow have been made at nearly 2,000 points in the United States and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1911 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points in the United States, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country, and will be made available in the regular surface water-supply papers from time to time. A complete list of the gaging stations maintained by the Survey to and including 1910 and a list of the papers relating to the water supply of the country has been published by the Survey as Water-Supply Paper 280. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119.

For each calendar year there has been prepared a report embodying the stream-flow data collected during that year, which has been published either as a part of the annual report of the Director, as a bulletin, or as a water-supply paper, as shown by the following table:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A, pt. 2	.....do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River and Missouri River.	1898
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	.....do	1903.
WS 124 to 135	.....do	1904.
WS 165 to 178	.....do	1905.
WS 201 to 214	Complete data, except descriptions	1906.
WS 241 to 252	.....do	1907-8.
WS 261 to 272	.....do	1909.
WS 281 to 292	.....do	1910.
WS 301 to 312	.....do	1911.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1911. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1911, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, and 301, which contain records for the New England streams from 1903 to 1911.

Numbers of water-supply papers containing results of stream measurements, 1899-1911.

	1899 [a]	1900 [b]	1901	1902	1903	1904
North Atlantic coast (St. John River to York River)	35	47, [c] 48	65, 75	82	97	[d] 124, [e] 125, [f] 126
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[g] 35, 36	48	65, 75	[g] 82, 83	[g] 97, 98	[f] 126, 127
Ohio River basin	36	48, [h] 49	65, 75	83	98	128
St. Lawrence River and Great Lakes	36	49	65, 75	[i] 82, 83	97	129
Hudson Bay and upper Mississippi River	36	49	[j] 65, 66, 75	[j] 83, 85	[j] 98, 99, 100	[j] 128, 130
Missouri River	[k] 36, 37	49, [l] 50	66, 75	84	99	130, [m] 131
Lower Mississippi River	37	50	[j] 65, 66, 75	[j] 83, 84	[j] 98, 99	[j] 128, 131
Western Gulf of Mexico	37	50	66, 75	84	99	132
Colorado River	[n] 37, 38	50	66, 75	85	100	133
Great Basin	38, [p] 39	51	66, 75	85	100	133, [q] 134
Pacific coast in California	38, [r] 39	51	66, 75	85	100	134
North Pacific coast	38	51	66, 75	85	100	135

	1905	1906	1907-8	1909	1910	1911
North Atlantic coast (St. John River to York River)	[d] 165, [e] 166, [f] 167	[d] 201, [e] 202, [f] 203	241	261	281	301
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[f] 167, 168	[f] 203, 204	242	262	282	302
Ohio River basin	169	205	243	263	283	303
St. Lawrence River and Great Lakes	170	206	244	264	284	304
Hudson Bay and upper Mississippi River	171	207	245	265	285	305
Missouri River	172	208	246	266	286	306
Lower Mississippi River	[j] 169, 173	[j] 205, 209	247	267	287	307
Western Gulf of Mexico	174	210	248	268	288	308
Colorado River	175, [o] 177	211	249	269	289	309
Great Basin	176, [q] 177	212, [q] 213	250, [q] 251	270, [q] 271	290	310
Pacific coast in California	177	213	251	271	291	311
North Pacific coast	[s] 177, 178	214	252	272	292	312

[a] Rating tables and index to Water-Supply Papers 35-39 contained in Water-Supply Paper 39.

[b] Rating tables and index to Water-Supply Papers 47-52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

[c] Wissahickon and Schuylkill rivers to James River.

[d] New England rivers only.

[e] Hudson River to Delaware River, inclusive.

[f] Susquehanna River to Yadkin River, inclusive.

[g] James River only.

[h] Scioto River.

[i] Lake Ontario and tributaries to St. Lawrence River proper.

[j] Tributaries of Mississippi from east.

[k] Gallatin River.

[l] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

[m] Platte and Kansas rivers.

[n] Green and Gunnison rivers and Grand River above junction with Gunnison.

[o] Below junction with Gila.

[p] Mohave River only.

[q] Great Basin in California, excepting Truckee and Carson drainage basins.

[r] Kings and Kern rivers and south Pacific coast drainage basins.

[s] Rogue, Umpqua, and Siletz rivers only.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile; and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is a measure of the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet, and is the quantity of water required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge (second-feet per square mile).	Run-off (depth in inches).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1..........	0.03719	1.041	1.079	1.116	1.153
2..........	.07438	2.083	2.157	2.231	2.306
3..........	.11157	3.124	3.236	3.347	3.459
4..........	.14876	4.165	4.314	4.463	4.612
5..........	.18595	5,207	5.393	5.578	5.764
6..........	.22314	6.248	6.471	6.694	6.917
7..........	.26033	7.289	7.550	7.810	8.070
8..........	.29752	8.331	8.628	8.926	9.223
9..........	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge (second-feet).	Run-off (acre-feet).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1..........	1.983	55.54	57.52	59.50	61.49
2..........	3.967	111.1	115.0	119.0	123.0
3..........	5.950	166.6	172.6	178.5	184.5
4..........	7.934	222.1	230.1	238.0	246.0
5..........	9.917	277.7	287.6	297.5	307.4
6..........	11.90	333.2	345.1	357.0	368.9
7..........	13.88	388.8	402.6	416.5	430.4
8..........	15.87	444.3	460.2	476.0	491.9
9..........	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply the values for one day by the number of days.

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.

1 second-foot for one year equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one day equals 86,400 cubic feet.

1,000,000,000 (1 billion U. S.) cubic feet equals 11,570 second-feet for one day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.

100 California miner's inches equals 18.7 United States gallons per second.

100 California miner's inches for one day equals 4.96 acre-feet.

100 Colorado miner's inches equals 2.60 second-feet.

100 Colorado miner's inches equals 19.5 United States gallons per second.

100 Colorado miner's inches for one day equals 5.17 acre-feet.

100 United States gallons per minute equals 0.223 second-feet.

100 United States gallons per minute for one day equals 0.442 acre-foot.

1,000,000 United States gallons per day equals 1.55 second-feet.

1,000,000 United States gallons equals 3.07 acre-feet.

1,000,000 cubic feet equals 22.95 acre-feet.

1 acre-foot equals 325,850 gallons.

1 inch deep on 1 square mile equals 2,323,200 cubic feet.

1 inch deep on 1 square mile equals 0.0737 second-foot per year.

1 foot equals 0.3048 meter.

1 mile equals 1.60935 kilometers.

1 mile equals 5,280 feet.

1 acre equals 0.4047 hectare.

1 acre equals 43,560 square feet.

1 acre equals 209 feet square, nearly.

1 square mile equals 2.59 square kilometers.

1 cubic foot equals 0.0283 cubic meter.

1 cubic foot of water weighs 62.5 pounds.

1 cubic meter per minute equals 0.5886 second-foot.

1 horsepower equals 550 foot-pounds per second.

1 horsepower equals 76.0 kilogram-meters per second.

1 horsepower equals 746 watts.

1 horsepower equals 1 second-foot falling 8.80 feet.

1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current meter gaging station the following data are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report but can be determined from the tables of daily gage heights and daily discharge, as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater periods.

The table of daily discharge gives the discharge in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed ''Maxi
gives the mean flow, as determined from the rating table, for t
when the mean gage height was highest. As the gage height
mean for the day, it does not indicate correctly the stage wh
water surface was at crest height and the corresponding dis
was consequently larger than given in the maximum column.
wise in the column headed ''Minimum'' the quantity given is the
flow for the day when the mean gage height was lowest. The c
headed ''Mean'' is the average flow in cubic feet for each secon
ing the month. On this the computations for the remaining col
which are defined on page 9, are based.

The field methods used in the collection of the data presen
this series of reports are described in the introductory secti
Water-Supply Papers 261 to 272, inclusive, ''Surface water sup
the United States, 1909.''

Plates I and II show the average run-off and rainfall in the U
States as determined from the measurements of stream flow
by the Geological Survey and records of rainfall collected b
Weather Bureau. Plate III shows typical gaging stations, indic
the method of suspending the current meter; Plate IV shows cu
meters[1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA A COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables ''well defined'' indicates, in general, that the rating is probably accurate within 5 per cent; ''fairly well defined,'' within 10 per cent; ''poorly defined'' or ''approximate,'' within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

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[1] See Hoyt, J. C., and others, Use and care of the current meter as practiced by the United States Geological Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

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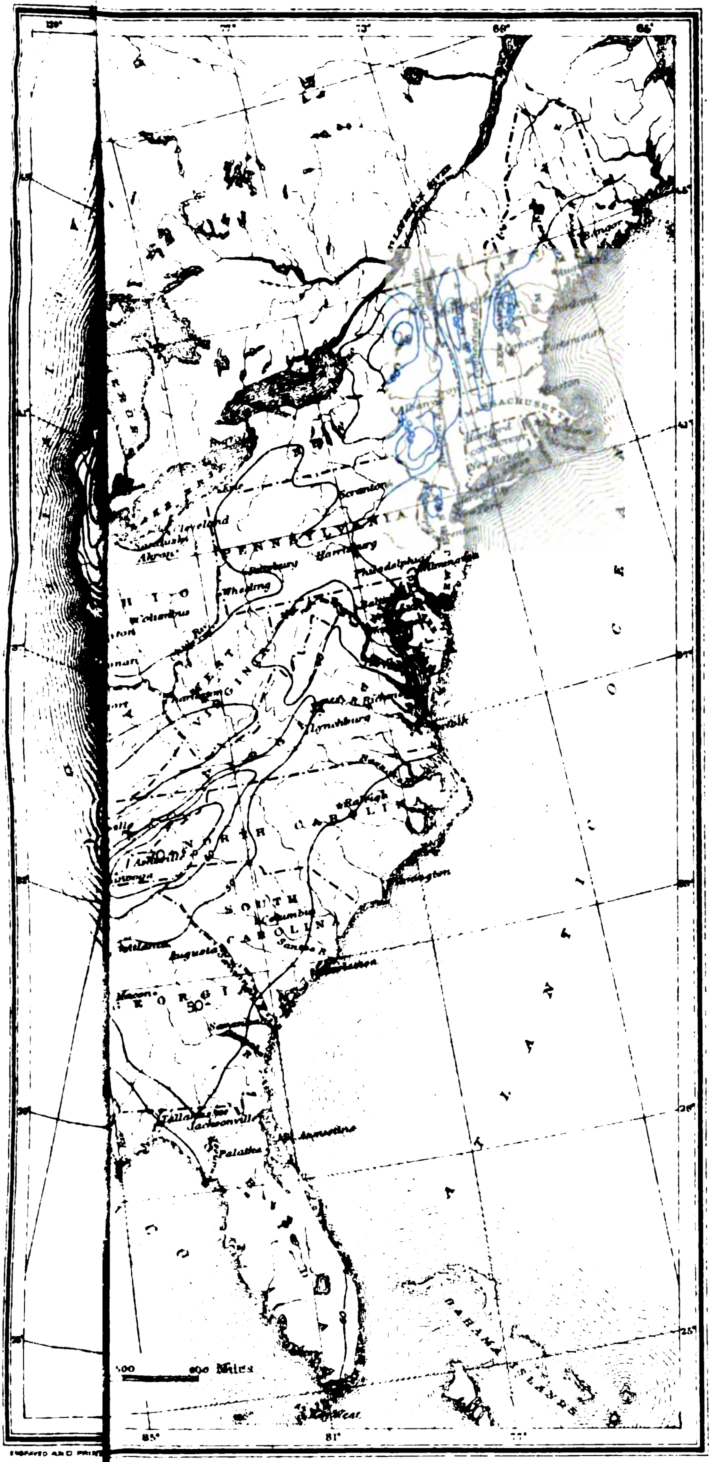
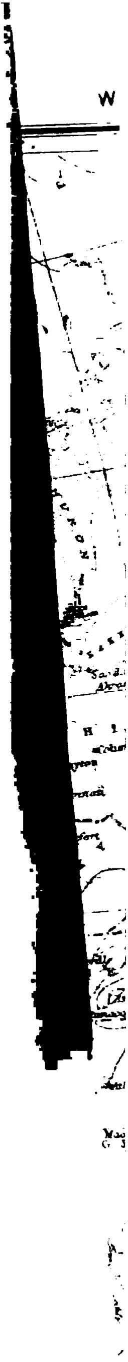
WATER-SUPPLY PAPERS 301 TO 312 PLATE I



TION

Prepared by Henry Gannett
mainly from data of the
United States Geological Survey
and United States Weather Bureau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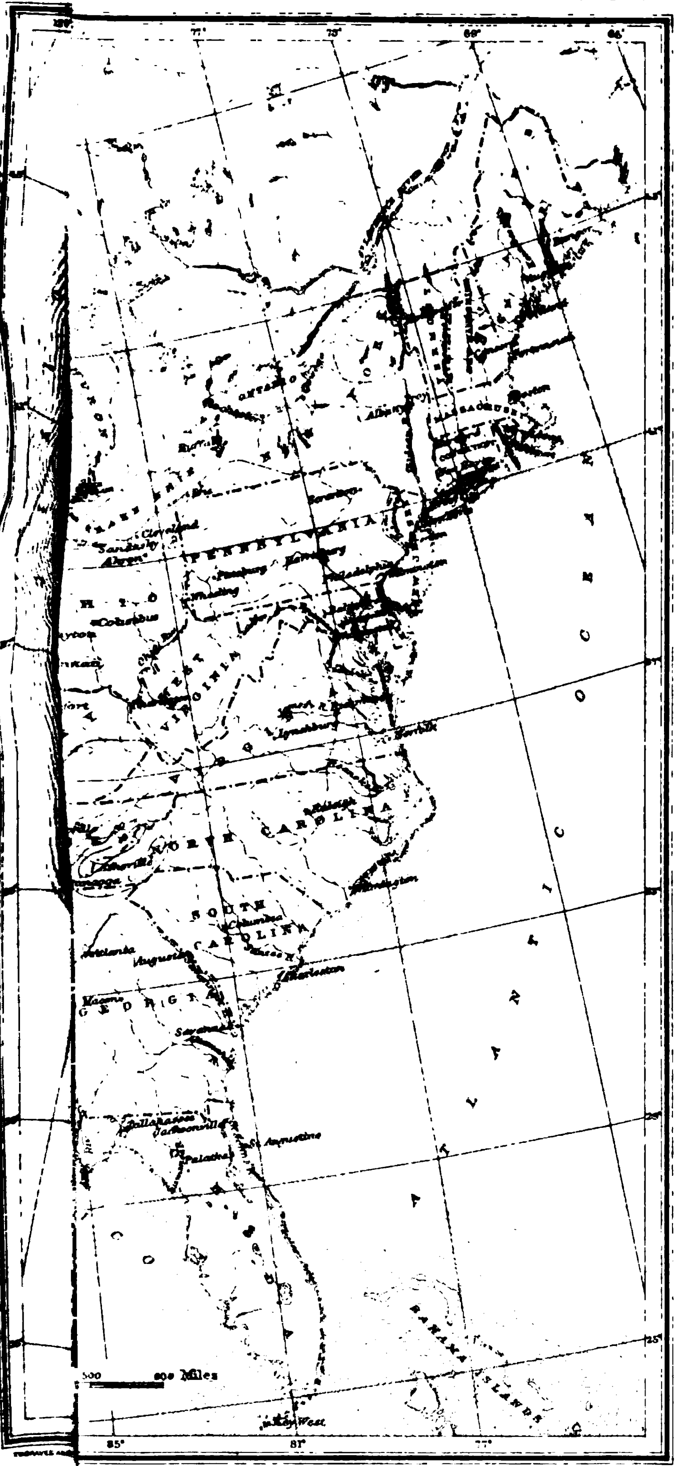
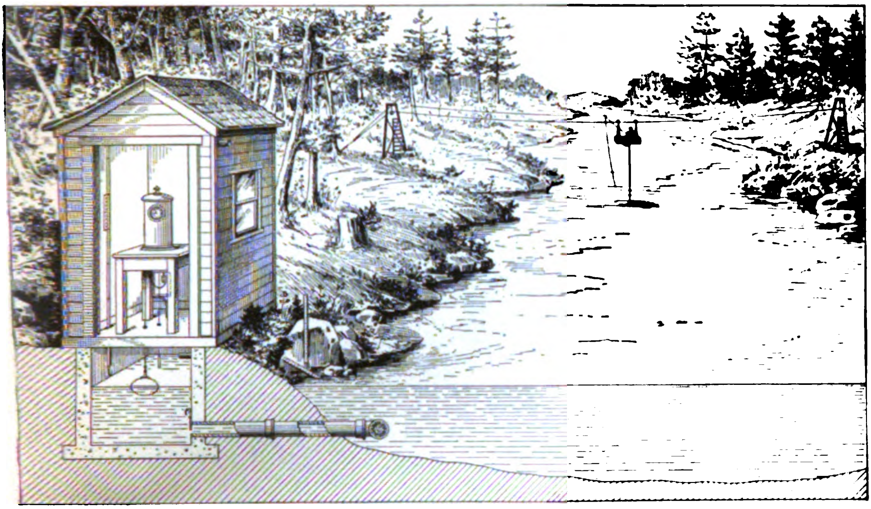


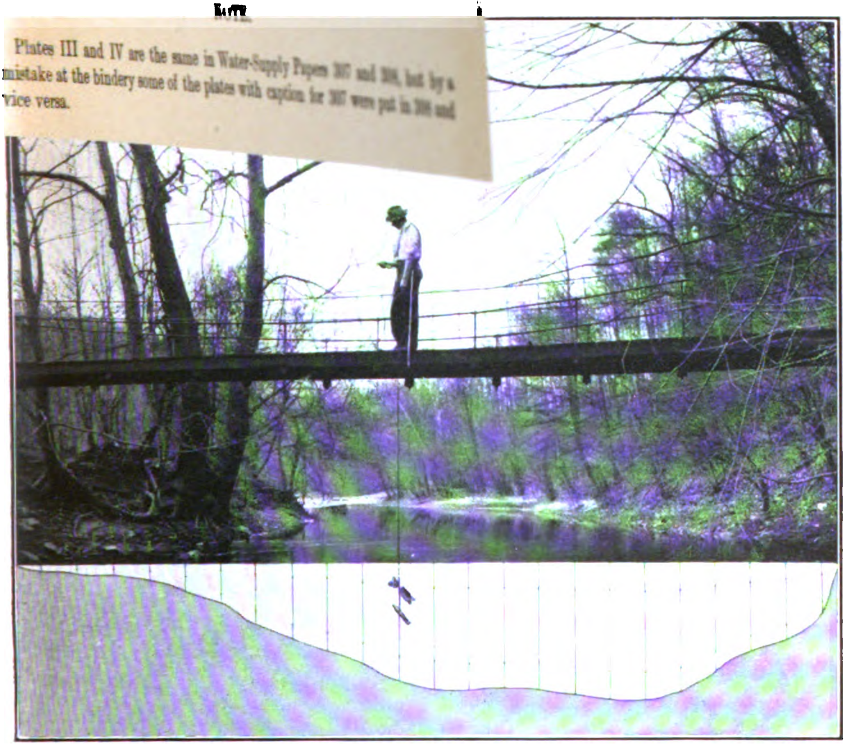
Prepared by Henry Gannett
mainly from data of the
United States Geological Survey



A. CABLE STATION WITH AUTOMATIC GAGE.

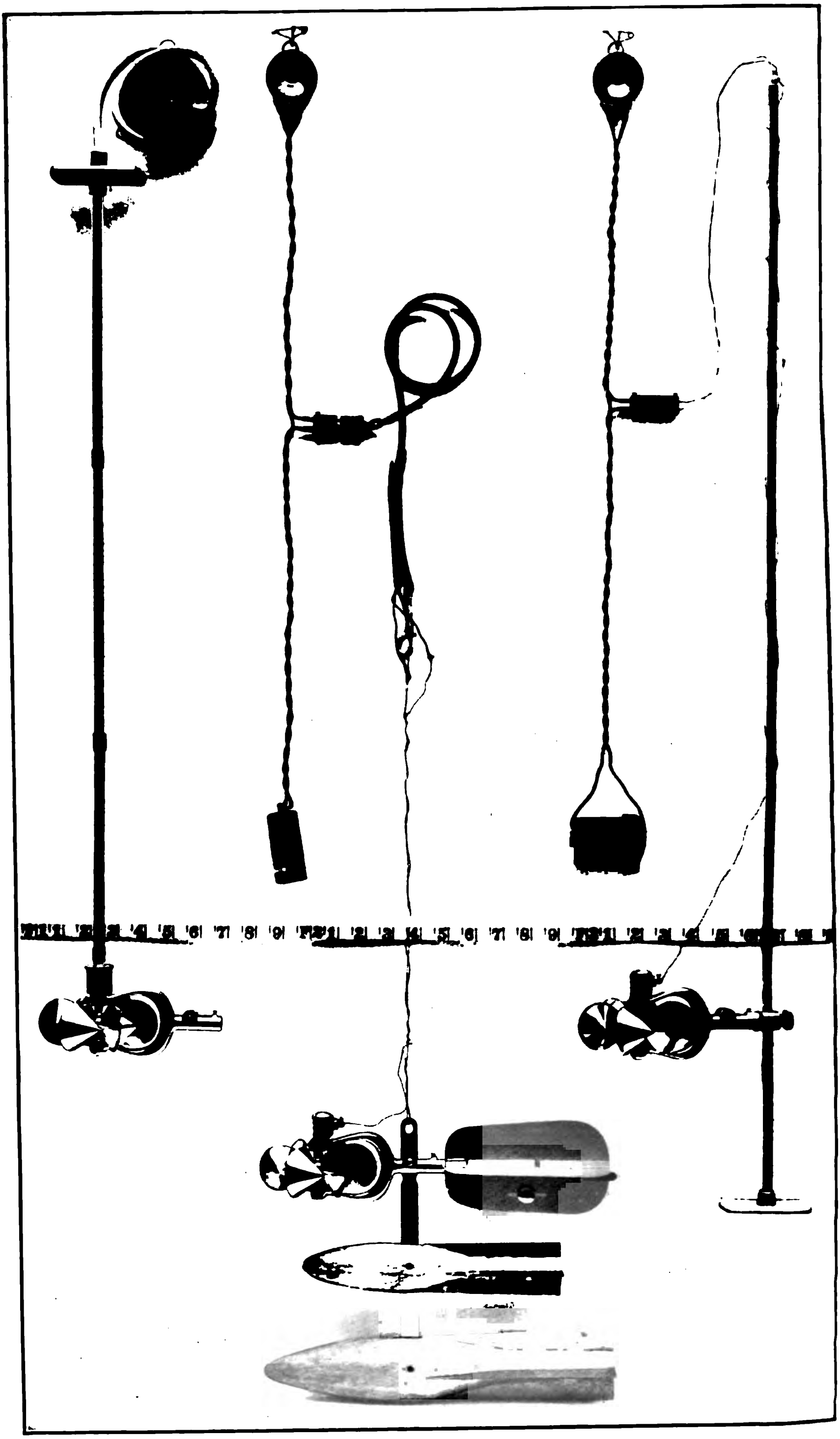
NOTE.

Plates III and IV are the same in Water-Supply Papers 307 and 308, but by a mistake at the bindery some of the plates with caption for 307 were put in 308 and vice versa.



B. FOR BRIDGE MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should, therefore, be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general, the base data collected each year by the Survey engineers are published, not only to comply with the law but also to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION AND ACKNOWLEDGMENTS.

The work in Colorado was carried on in cooperation with C. W. Comstock, State engineer, who collected the field data on the stations on the Rio Grande and furnished the entire records at a number of other stations, as noted in connection with the station descriptions; and with the United States Forest Service, which provided the services of a hydrographer for measuring the streams in the national forests and also furnished the gage heights.

In New Mexico the work was carried on in cooperation with C. D. Miller, Territorial engineer, who paid the field expenses incurred for most of the New Mexico stations and also paid the gage observers. Cooperation with the Atchison, Topeka & Santa Fe Railway Co.

and with other private parties was arranged by the Territorial engineer.

The records for Pecos River at Dayton and Lakewood were furnished by the United States Reclamation Service.

Gage heights on the Rio Pueblo de Taos and the Rio Lucero were collected by the United States Indian Office.

The stations on the Rio Grande in Texas and Mexico have been maintained in cooperation with the International Boundary Commission, Wilbur Keblinger, commissioner on the part of the United States; Señor Fernando Beltrán y Puga, commissioner on the part of Mexico; and W. W. Follett, consulting engineer on the part of the United States.

DIVISION OF WORK.

The field data in the Rio Grande basin were collected by the United States Geological Survey under the direction of W. B. Freeman, district engineer, who was assisted by G. A. Gray, E. O. Christiansen, J. B. Stewart, G. H. Russell, O. M. Wimmer, and H. B. Waha. Assistance in New Mexico was also rendered by R. L. Cooper and C. B. Digby, of the Territorial engineer's office.

With the exception of certain data furnished completely by the State of Colorado and the United States Reclamation Service, the computations and general review of the data were carried on under the direction of R. H. Bolster, hydraulic engineer, by G. K. Larrison, H. D. Padgett, A. H. Tuttle, H. J. Dean, and M. I. Walters.

The manuscript was edited by Mrs. B. D. Wood.

BRAZOS RIVER BASIN.

BRAZOS RIVER AT WACO, TEX.

Location.—Suspension Bridge on Bridge Street, Waco, Tex.

Records available.—September 14, 1898, to December 31, 1911.

Drainage area.—30,800 square miles.

Gage.—Chain; attached to downstream upper chord of stiffening truss of bridge. So far as known datum unchanged since establishment of station.

Channel.—Bed is composed of sand, is free from vegetation, and shifts. Right bank of limestone; not inundated by floods; left bank is high but is overflowed at flood stages. A single-span truss bridge crosses the river at an angle of about 76° about 300 feet above the bridge. A few hundred feet below the gage sand is taken out of the river for commercial purposes. Between this point and the gage the channel is modified at low stages to direct the current away from or toward certain discharge pipes from factories.

Discharge measurements.—Made from suspension bridge.

Accuracy.—The low-stage rating curve is unstable on account of the shifting sands.

The following measurement was made by R. G. Tyler:

December 27, 1911: Gage height, 5.2 feet; discharge, 2,780 second-feet. This measurement does not agree with the 1907–1910 rating curve by a considerable difference, and hence estimates of discharge for 1911, which are based on this curve, are probably very poor.

Daily gage height, in feet, of Brazos River at Waco, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.5	1.0	4.0	4.5	2.8	1.1	1.0	3.1	12.6	3.0	1.8	1.8
2	1.5	1.0	3.6	3.6	2.2	1.0	.9	3.0	9.0	2.8	1.8	1.8
3	1.4	1.0	3.5	3.2	1.9	1.0	.9	2.8	8.6	2.8	1.7	1.7
4	1.4	.9	3.3	7.1	1.9	.9	.9	2.6	7.1	2.6	1.7	1.7
5	1.3	.9	3.2	4.6	3.6	.9	.8	2.6	11.4	2.5	1.8	1.7
6	1.3	.9	3.0	3.3	3.3	.9	.8	2.5	15.5	2.5	1.8	1.8
7	1.1	.8	3.0	2.8	3.2	.8	.8	2.4	11.4	2.4	1.8	2.2
8	1.1	.8	2.9	2.4	3.0	.8	.8	3.8	13.0	2.4	2.0	2.0
9	1.0	1.0	2.7	2.2	2.9	2.4	1.4	5.4	9.6	2.4	2.0	2.0
10	1.0	1.2	2.6	2.2	2.8	2.2	2.6	4.6	7.8	2.3	2.0	2.4
11	1.1	1.5	2.5	2.1	2.5	2.0	1.6	6.1	7.4	2.3	2.0	2.6
12	1.1	1.5	2.5	2.0	2.6	1.9	1.6	5.0	6.6	2.8	2.0	2.4
13	1.1	1.5	2.4	2.0	3.6	1.7	2.8	4.6	6.0	3.3	2.0	10.1
14	1.0	1.5	2.1	1.9	2.4	1.5	2.2	3.6	5.4	3.0	1.8	8.2
15	1.0	1.4	2.0	2.3	2.2	1.4	5.5	3.1	6.4	2.5	1.8	7.1
16	1.0	1.4	2.0	2.6	2.0	1.3	3.0	2.8	5.1	2.5	1.8	7.4
17	1.0	1.6	2.0	3.0	2.0	1.2	5.5	2.5	4.8	2.0	2.0	6.1
18	1.1	1.5	1.9	2.6	1.9	1.2	18.5	2.3	4.2	1.7	2.0	4.8
19	1.1	1.5	2.0	2.4	1.8	1.2	8.1	2.2	3.8	2.5	1.8	4.1
20	1.1	1.8	2.0	2.2	1.8	1.1	10.1	2.1	3.5	2.1	1.8	5.0
21	1.1	1.8	2.0	2.1	2.0	1.0	7.6	2.0	3.4	2.0	1.8	4.4
22	1.0	10.6	2.1	2.5	2.0	1.0	8.0	2.0	3.1	2.0	1.8	9.6
23	1.0	7.8	2.0	2.7	1.9	1.0	6.2	1.8	5.2	2.0	1.9	9.1
24	1.0	6.6	2.0	2.4	1.8	1.8	5.5	2.6	4.1	1.9	1.9	6.5
25	1.0	6.4	2.0	1.9	1.7	1.6	9.5	2.5	3.4	1.8	1.9	6.0
26	.9	5.5	2.2	1.8	1.6	1.5	6.6	2.5	3.0	1.8	1.8	5.4
27	1.1	4.6	2.0	1.8	1.5	1.4	5.1	2.5	2.5	1.8	1.8	4.6
28	1.1	4.2	2.0	1.8	1.4	1.4	4.5	5.2	2.5	1.9	1.8	4.0
29	1.1	....	1.9	1.8	1.3	1.2	4.1	4.4	2.5	1.8	1.8	4.0
30	1.0	....	1.9	1.7	1.3	1.1	3.8	11.5	3.0	1.9	1.8	4.0
31	1.0	....	1.9	....	1.2	....	3.2	13.6	....	1.9	....	4.0

Daily discharge, in second-feet, of Brazos River at Waco, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	34	8	1,060	1,500	290	10	8	410	16,410	365	70	70
2	34	8	740	740	140	8	6	365	8,190	290	70	70
3	26	8	665	460	86	8	6	290	7,410	290	56	56
4	26	6	520	4,800	86	6	6	234	4,800	234	56	56
5	20	6	460	1,600	740	6	4	234	13,500	208	70	56
6	20	6	365	520	520	6	4	208	24,800	208	70	70
7	10	4	365	290	460	4	4	184	13,500	184	70	140
8	10	4	325	184	365	4	4	900	17,400	184	102	102
9	8	8	260	140	325	184	26	2,460	9,410	184	102	102
10	8	14	234	140	290	140	234	1,600	5,940	162	102	184
11	10	34	208	120	208	102	44	3,360	5,280	162	102	234
12	10	34	208	102	234	86	44	2,000	4,060	290	102	184
13	10	34	184	102	740	56	290	1,600	3,220	520	102	10,500
14	8	34	120	86	184	34	140	740	2,460	365	70	6,660
15	8	26	102	162	140	26	2,580	410	3,770	208	70	4,800
16	8	26	102	234	102	420	365	290	2,120	208	70	5,280
17	8	44	102	365	102	14	2,580	208	1,800	102	102	3,360
18	10	34	86	234	86	14	35,400	162	1,240	56	102	1,800
19	10	34	102	184	70	14	6,480	140	900	208	70	1,150
20	10	70	102	140	70	10	10,500	120	665	120	70	2,000
21	10	70	102	120	102	8	5,600	102	590	102	70	1,410
22	8	11,600	120	208	102	8	6,300	102	410	102	70	9,410
23	8	5,940	102	260	86	8	3,490	70	2,220	102	86	8,400
24	8	4,060	102	184	70	70	2,580	234	1,150	86	86	3,910
25	8	3,770	102	86	56	44	9,200	208	590	70	86	3,220
26	6	2,580	140	70	44	34	4,060	208	365	70	70	2,460
27	10	1,600	102	70	34	26	2,120	208	208	70	70	1,600
28	10	1,240	102	70	26	26	1,500	2,220	208	86	70	1,060
29	10	....	86	70	20	14	1,150	1,410	208	70	70	1,060
30	8	....	86	56	20	10	900	13,700	365	86	70	1,060
31	8	....	86	....	14	....	460	19,100	....	86	....	1,060

NOTE.—Daily discharge determined from a rating curve of doubtful accuracy.

Monthly discharge of Brazos River at Waco, Tex., for 1911.

[Drainage area, 30,800 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	34	8	12.3	0.0004	0.0005	756	D.
February	11,600	4	1,120	.036	.04	62,200	D.
March	1,060	86	240	.0078	.01	14,800	D.
April	4,800	56	443	.014	.02	26,400	D.
May	740	14	187	.006	.01	11,500	D.
June	184	4	33.3	.0011	.001	1,960	D.
July	35,400	4	3,100	.101	.12	191,000	D.
August	19,100	70	1,720	.056	.06	106,000	D.
September	24,800	208	5,110	.166	.19	304,000	D.
October	520	56	177	.0057	.01	10,900	D.
November	102	56	79.2	.0026	.003	4,710	D.
December	10,500	56	2,310	.075	.01	142,000	D.
The year	35,400	4	1,210	.0393	.47	876,000	

COLORADO RIVER (OF TEXAS) BASIN.

COLORADO RIVER AT AUSTIN, TEX.

Location.—At the Congress Avenue Bridge, south of the city of Austin, to which point it was removed on the failure of the Austin dam in April, 1900.

Records available.—December 21, 1897, to December 31, 1911.

Drainage area.—37,000 square miles.

Gage.—A staff consisting of upright posts driven into the bed of the river near the bathhouse about 150 feet above the bridge. At stages not readable on the staff gage observations are made at the first pier (from the north) on the bridge which has been marked up to 21 feet; at stages above 21 feet the chain gage is used.

Channel.—Bed of stream composed of sand and gravel; shifts slightly; current moderately rapid; neither bank has been overflowed since the dam was washed away. The low-water level at this point has been gradually falling for several years as a result of erosion of the channel about 200 yards below the highway bridge. Under the highway bridge the water spreads out into a large pool, the outlet of which is through two contracted channels below, the main one being that in which the erosion has taken place; the lowest level recorded was 0.45 foot by gage August 13–20, 1910.

Discharge measurements.—Made from the bridge. No measurements were made during 1911, and hence estimates of discharge are withheld.

Daily gage height, in feet, of Colorado River at Austin, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.0	1.1	2.0	1.6	2.5	1.0	.9	1.9	8.0	1.8	1.0	.9
2	1.0	1.1	1.8	1.6	3.0	.9	.9	1.9	6.0	1.8	.9	.9
3	1.0	1.1	1.7	1.6	5.8	.9	.8	1.8	4.2	1.7	.9	.9
4	1.0	1.0	1.6	1.9	4.9	2.0	.8	1.6	2.5	1.7	1.0	.9
5	1.0	1.0	1.7	3.2	3.7	2.0	.8	1.8	2.5	1.5	1.0	.9
6	.9	1.0	1.7	2.9	3.0	1.8	.8	3.2	9.0	1.4	1.0	.9
7	.9	1.0	1.7	2.5	2.8	1.6	.8	3.0	10.0	1.4	1.0	1.0
8	.9	1.0	1.6	2.2	2.5	1.4	.8	2.6	8.6	1.4	1.1	1.0
9	.9	.9	1.6	2.2	2.3	1.3	.7	2.3	6.5	1.4	1.2	1.0
10	.9	.9	1.6	2.4	2.0	1.3	.7	2.0	4.6	1.3	1.1	1.0
11	.9	1.2	1.6	2.5	2.0	1.2	.7	1.9	3.0	1.3	1.0	1.1
12	.9	1.3	1.5	2.3	2.1	1.1	.7	1.9	2.5	1.3	1.0	1.1
13	.9	1.2	1.5	2.1	2.0	1.1	.7	1.7	2.3	1.4	1.0	1.1
14	.9	1.2	1.5	2.0	2.0	1.0	.7	1.5	2.3	1.4	1.0	7.5
15	1.0	2.0	1.4	1.8	2.0	1.0	1.6	1.4	2.2	1.3	1.0	3.8

Daily gage height, in feet, of Colorado River at Austin, Tex., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	1.0	1.9	1.4	1.8	2.0	1.0	1.5	1.6	2.0	1.3	1.0	2.6
17	1.0	1.7	1.4	6.2	2.3	1.0	1.5	1.6	1.9	1.3	1.0	2.2
18	1.1	1.5	1.4	6.3	2.3	.9	1.6	1.5	1.8	1.2	1.0	2.0
19	1.1	1.8	1.5	4.5	2.2	.9	1.8	1.4	1.8	1.2	.9	1.8
20	1.1	1.9	1.6	3.5	2.1	.9	3.5	1.3	1.8	1.2	.9	1.6
21	1.1	2.2	1.5	2.4	1.8	.9	4.5	1.1	1.6	1.2	.9	1.5
22	1.1	8.6	1.5	1.8	1.5	.9	2.9	1.0	1.5	1.3	.9	1.4
23	1.1	9.0	1.5	3.6	1.4	.8	2.6	.9	1.4	1.4	.9	2.0
24	1.2	8.2	1.5	8.0	1.3	.8	2.5	.9	1.5	1.3	.9	2.5
25	1.2	6.4	1.5	5.0	1.3	.8	2.4	.9	1.5	1.3	1.0	2.4
26	1.2	4.8	1.5	3.9	1.1	.8	2.3	.9	1.5	1.3	1.0	2.3
27	1.2	3.2	1.5	3.7	1.1	1.2	5.2	.9	1.8	1.3	.9	2.1
28	1.1	2.6	1.5	2.9	1.0	1.0	6.6	1.8	1.8	1.2	.9	2.0
29	1.1	....	1.5	2.5	1.0	.9	4.3	1.4	1.7	1.2	.9	1.8
30	1.1	....	1.5	2.4	1.0	1.0	3.1	6.0	1.8	1.1	.9	1.7
31	1.1	....	1.5	....	1.0	....	2.4	5.2	....	1.0	....	1.6

EVAPORATION AT AUSTIN, TEX.

The rate of evaporation at Austin has been measured during 1911 at a station at the residence of H. B. Beck, adjoining Hyde Park. A cement pit 5 feet square and 5 feet deep is kept practically full of water in which floats a galvanized pan, 30 inches long by 24$\frac{1}{16}$ inches wide, so that 1 gill of water will raise the level of the water 0.01 inch over the surface of the pan. The pan is protected from waves and other disturbing influences by a border of floating planks. The results of the measurements are shown in the following table:

The total evaporation for the year amounted to 50.92 inches; rain fell on 58 days of the year.

Evaporation data for 1911 at Austin, Tex.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.14	0.01	R.	0.11	0.14	0.24	0.20	0.35	0.22	0.27	0.18	0.08
2	.14	.12	0.11	.14	R.	.27	.16	.28	.26	.19	.00	.06
3	.14	.11	.13	.12	.03	.24	.16	.34	.30	.22	.03	.14
4	.14	.17	.08	.15	.01	.20	.32	.30	.23	.15	.04	.06
5	.16	.03	.09	.17	.17	.23	.26	.48	.23	.18	.08	.10
6	.16	.08	.04	.19	.09	.28	R.	.18	.24	R.	R.	.08
7	.16	.09	.04	.31	.20	.26	.14	.28	.24	.01	R.	R.
8	.08	.07	.18	.16	.07	.27	.22	.32	.22	.20	R.	R.
9	.08	R.	.14	R.	.20	.27	.30	.38	.22	.10	.03	R.
10	.12	R.	.14	.10	.19	.26	.23	.22	.31	.00	.08	R.
11	.13	.02	.07	.13	.10	.23	.26	.28	.25	R.	.06	.08
12	.20	R.	.16	.12	R.	.24	.26	.33	.26	R.	.04	.12
13	R.	.03	.22	.24	.07	.23	.26	.29	.29	R.	.02	.08
14	R.	.02	R.	R.	.18	.25	.23	.28	.22	R.	.03	.06
15	.05	.01	.18	.05	.16	.30	R.	.12	.28	R.	.04	.08
16	.05	.02	R.	.10	.16	.27	.14	.25	.26	.23	.08	.00
17	R.	R.	R.	R.	.15	.27	R.	.29	.22	.13	.18	.01
18	R.	R.	R.	R.	.19	.28	.24	.35	.24	.12	.00	R.
19	.07	.12	.08	R.	.08	.21	.28	.29	.32	.12	.03	R.
20	.03	.18	R.	R.	.18	.34	.25	.35	.16	.18	.04	.12
21	.09	.18	.12	.08	.22	.27	.31	.33	.08	.14	.08	.01
22	.17	.14	.14	.56	.28	.20	.37	.34	R.	R.	.03	.00
23	R.	.15	.14	R.	.24	.30	.32	.30	.11	.08	.04	.00
24	.04	.15	R.	.14	.24	.25	.39	.30	.17	.06	.10	R.
25	.03	.02	R.	R.	.28	.29	.28	R.	.25	.08	.01	R.
26	.02	R.	.20	.02	.20	.36	.25	.25	.25	.12	.06	.00
27	.01	R.	.08	.08	.20	.30	.30	.30	.35	.10	.04	.12
28	.00	R.	.14	.04	.18	.28	.30	.06	.24	.12	.04	R.
29	.08	....	.10	.06	.18	.31	.26	.16	R.	R.	.03	.12
30	.14	....	.04	....	.17	.26	.34	.32	.27	R.	.02	.00
31	.09	....	....	....	.14	....	.30	.26	....	.06	.10	.04
Total	2.52	1.72	2.62	3.07	4.70	7.96	7.33	8.58	6.69	2.86	1.51	1.36

NOTE.—Total for year=50.92 inches=4.24 feet; 58 days rain (R.).

COLORADO RIVER AT COLUMBUS, TEX.

Location.—Highway bridge east of Columbus, Tex.

Records available.—January 1, 1903, to December 31, 1911.

Drainage area.—40,000 square miles.

Gage.—Marked on the downstream side of pier on the west side of the river. No change of datum so far as known.

Channel.—Bed is composed of gravel and sand and is fairly permanent. At low stages the channel is unobstructed by piers, but at high stages the flow is obstructed by two piers. At extreme high stages the left bank is overflowed for several hundred feet under the trestle approach to the bridge.

Discharge measurements.—Made from the bridge.

The following discharge measurement was made by R. G. Tyler:

December, 1911: Gage height, 10 feet; discharge, 3,890 second-feet. This measurement plots about 30 per cent in excess of the 1907-1910 rating curve, and hence estimates of discharge for 1911 which are based on this curve are probably very poor.

Daily gage height, in feet, of Colorado River at Columbus, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.4	4.9	10.9	6.7	17.5	6.5	5.3	12.0	9.8	7.0	6.4	5.0
2	7.7	4.8	10.0	7.8	14.4	6.4	5.3	10.8	15.0	6.9	6.2	5.0
3	6.5	4.8	9.4	7.5	15.1	6.2	5.2	9.8	19.6	7.2	6.1	4.9
4	6.4	4.8	8.9	10.8	13.4	6.0	5.0	9.1	15.7	7.4	6.0	4.9
5	6.2	4.7	8.4	10.7	16.1	5.9	4.9	8.5	13.2	7.1	5.9	4.8
6	6.1	4.7	8.1	8.2	14.8	5.8	4.9	8.0	11.5	6.9	5.8	4.8
7	6.0	4.7	7.4	8.7	13.4	5.8	4.9	7.7	10.3	6.8	6.1	4.8
8	6.0	4.7	7.2	10.2	12.2	7.7	4.9	7.4	17.2	6.7	6.5	4.8
9	5.9	4.6	7.2	8.2	11.1	7.5	5.0	10.8	22.2	6.6	6.7	4.8
10	5.8	4.6	7.1	8.6	10.3	7.3	5.3	10.9	20.6	6.4	6.8	5.6
11	5.8	4.6	7.0	8.2	9.7	7.1	5.2	9.8	16.1	6.2	6.6	12.5
12	5.6	4.5	7.0	8.2	13.8	6.9	5.1	8.9	14.3	6.2	6.5	6.8
13	5.6	4.5	6.8	8.3	14.6	6.8	5.0	8.2	12.5	6.6	6.3	6.6
14	5.5	4.5	6.7	8.6	14.8	6.6	5.0	7.9	11.4	7.4	6.1	6.4
15	5.5	4.5	6.6	8.2	11.4	6.2	5.0	7.6	10.5	6.8	6.0	14.5
16	5.4	4.5	6.5	7.8	9.4	6.0	5.1	7.4	9.7	6.4	5.9	17.5
17	5.4	4.5	6.4	7.3	8.9	5.9	5.1	7.1	9.1	6.3	5.9	13.5
18	5.3	4.5	6.3	7.1	8.4	5.8	5.2	6.9	8.7	6.1	5.8	11.3
19	5.2	6.6	6.2	19.2	8.2	5.7	5.3	6.7	8.3	6.0	5.8	10.2
20	5.3	12.5	7.5	15.2	9.2	5.7	6.5	6.6	8.0	5.9	5.7	12.7
21	5.2	8.8	6.5	13.7	12.5	5.6	6.4	6.6	7.6	5.9	5.7	11.3
22	5.2	7.9	6.4	12.5	9.6	5.5	8.8	6.5	7.4	5.8	5.6	9.9
23	5.2	7.4	6.7	11.5	8.8	7.1	12.7	6.4	7.3	6.8	5.6	8.6
24	5.2	20.2	7.5	13.3	8.2	6.0	11.6	6.3	7.2	6.7	5.5	8.1
25	5.1	21.3	7.9	15.1	7.9	5.9	10.6	6.2	7.1	6.6	5.4	7.9
26	5.1	18.7	15.1	18.2	7.6	5.8	9.6	6.1	7.0	6.4	5.4	7.8
27	5.1	14.4	10.0	16.5	7.4	5.6	9.3	6.0	7.1	6.3	5.3	8.2
28	5.0	12.2	8.2	14.2	7.2	5.5	8.9	5.9	7.0	6.2	5.2	9.4
29	5.0	....	7.0	13.1	7.0	5.4	14.9	5.9	6.8	6.1	5.2	8.9
30	5.0	....	6.7	11.8	6.8	5.4	17.0	6.0	6.6	6.1	5.1	8.7
31	5.0	....	6.5	....	6.6	....	13.6	5.9	....	6.6	....	8.4

Daily discharge, in second-feet, of Colorado River at Columbus, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,520	215	3,970	1,120	10,500	1,000	400	4,850	3,130	1,280	950	260
2	1,700	175	3,270	1,760	6,990	950	400	3,890	7,590	1,220	850	260
3	1,000	175	2,850	1,580	7,690	850	350	3,130	13,400	1,400	800	215
4	950	175	2,500	3,890	6,070	750	260	2,640	8,330	1,520	750	215
5	850	135	2,150	3,810	8,780	700	215	2,220	5,890	1,340	700	175
6	800	135	1,940	2,010	7,390	650	215	1,880	4,450	1,220	650	175
7	750	135	1,520	2,360	6,070	650	215	1,700	3,490	1,170	800	175
8	750	135	1,400	3,410	5,010	1,700	215	1,520	10,100	1,120	1,000	175
9	700	100	1,400	2,010	4,130	1,580	260	3,890	17,400	1,060	1,120	175
10	650	100	1,340	2,290	3,490	1,460	400	3,970	14,900	950	1,170	550
11	650	100	1,280	2,010	3,060	1,340	350	3,130	8,780	850	1,060	5,260
12	550	70	1,280	2,010	6,430	1,220	305	2,500	6,890	850	1,000	1,170
13	550	70	1,170	2,080	7,190	1,170	260	2,010	5,260	1,060	900	1,060
14	500	70	1,120	2,290	7,390	1,060	260	1,820	4,370	1,520	800	950
15	500	70	1,060	2,010	4,370	850	260	1,640	3,650	1,170	750	7,090
16	450	70	1,000	1,760	2,850	750	305	1,520	3,060	950	700	10,500
17	450	70	950	1,460	2,500	700	305	1,340	2,640	900	700	6,160
18	400	70	900	1,340	2,150	650	350	1,220	2,360	800	650	4,290
19	350	1,060	850	12,800	2,010	600	400	1,120	2,080	750	650	3,410
20	400	5,260	1,580	7,790	2,710	600	1,000	1,060	1,880	700	600	5,440
21	350	2,430	1,000	6,340	5,260	550	950	1,060	1,640	700	600	4,290
22	350	1,820	950	5,260	2,990	500	2,430	1,000	1,520	650	550	3,200
23	350	1,520	1,120	4,450	2,430	1,340	5,440	950	1,460	1,170	550	2,290
24	350	14,300	1,580	5,980	2,010	750	4,530	900	1,400	1,120	500	1,940
25	305	15,900	1,820	7,690	1,820	700	3,730	850	1,340	1,060	450	1,820
26	305	12,100	7,690	11,400	1,640	650	2,990	800	1,280	950	450	1,760
27	305	6,990	3,270	9,260	1,520	550	2,780	750	1,340	900	400	2,010
28	260	5,010	2,010	6,790	1,400	500	2,500	700	1,280	850	350	2,850
29	260	....	1,280	5,800	1,280	450	7,490	700	1,170	800	350	2,500
30	260	....	1,120	4,690	1,170	450	9,860	750	1,060	800	305	2,360
31	260	....	1,000	....	1,060	....	6,260	700	....	1,060	....	2,150

NOTE.—Daily discharge determined from a rating curve of doubtful accuracy.

Monthly discharge of Colorado River at Columbus, Tex., for 1911.

[Drainage area, 40,000 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,700	260	575	0.014	0.02	35,400	D.
February	15,900	70	2,440	.061	.06	136,000	D.
March	7,690	850	1,820	.046	.05	112,000	D.
April	12,800	1,120	4,250	.106	.12	253,000	D.
May	10,500	1,060	4,170	.104	.12	256,000	D.
June	1,700	450	856	.021	.02	50,900	D.
July	9,860	215	1,800	.045	.05	111,000	D.
August	4,850	700	1,810	.045	.05	111,000	D.
September	17,400	1,060	4,770	.119	.13	284,000	D.
October	1,520	650	1,030	.026	.03	63,300	D.
November	1,170	305	704	.018	.02	41,900	D.
December	10,500	175	2,420	.060	.07	149,000	D.
The year	17,400	70	2,210	.055	.74	1,600,000	

RIO GRANDE BASIN.

SEEPAGE INVESTIGATIONS ON THE RIO GRANDE.

An attempt to determine the gains and losses due to seepage on the Rio Grande, by measuring the river and all tributaries at various points between the State bridge near Lobatos, Colo., and San Marcial, N. Mex., was made by G. H. Russell, junior engineer. A series of measurements at different times had been planned, but as yet these additional measurements have not been made.

The work was begun at the State bridge near Lobatos, Colo., on March 7, and measurements were successively made down the river as far as San Marcial, N. Mex., the last measurement being made March 23.

The gage-height record shows a practically uniform stage of the river at Lobatos during this period, but a rise at Buckman, N. Mex., of 0.7 feet on March 11. This rise is thought to have been caused mostly by Chama River, which enters the Rio Grande a short distance above, but a part was undoubtedly due to melting of snow and a rain which occurred in the region around Taos about March 7. This rise, however, preceded the measurements all the way down, and as the Buckman gage record shows the stage of the river to have been practically constant for the several days succeeding the rise during which measurements were made, it is thought that the condition of the river was fairly even throughout the period.

From the State line down to a point a few miles below Embudo the river flows through a box canyon which is cut in a lava formation and ranges in depth from 50 feet at the State line to about 1,000 feet at Embudo. In this stretch the river is accessible at only a few places, as little water is contributed over the surface except by Red River, Rio Pueblo de Taos, and Embudo Creek. The water flowing at the heads of several other streams sinks soon after it reaches the sheet of lava that borders the river on either side and enters the river as seepage.

Between Embudo and Buckman the canyon widens out into a narrow valley in which some irrigation is carried on, and the river spreads out over a sandy bed and among islands.

From Buckman the river flows in a comparatively narrow channel through White Rocks Canyon to Cochiti. At Cochiti the valley opens again into a flat sandy plain, and thence practically to San Marcial the river spreads out over a broad bed and among sand bars. Along this stretch considerable irrigation is practiced.

The following tables show the results of the discharge measurements of the tributaries and of the Rio Grande at Lobatos, Dunn's ranch, Velarde, San Juan, Buckman, Cochiti, Bernalillo, Albuquerque, Belen, and San Marcial, including the record of daily gage heights taken from automatic gages at Lobatos and Buckman, for the period covered by the investigation.

At the Lobatos, the mouth of the Rio Hondo, San Juan, Buckman, Cochiti, and San Marcial, very good measurements of the Rio Grande were obtained. Conditions at the other measured sections were unfavorable and results are only fair.

It should be noted that the river loses little, if any, water by diversion or otherwise above Embudo, and that below Embudo more or less water is being diverted for irrigation; also, that in the lower stretch considerable loss from evaporation results from the spreading of the river over so much area and the openness of the valley.

The tables show an increase in seepage from Lobatos to San Juan, a decrease through the open valley from San Juan to Buckman, and an increase through White Rocks Canyon from Buckman to Cochiti and as far as Albuquerque. Below Albuquerque the increase from seepage lessens, and the lessening continues as far as San Marcial. The decrease in flow below Albuquerque is probably to a large extent due to evaporation, for at the time of the measurements very little water was being diverted for irrigation. Below Albuquerque the river probably receives little if any seepage water.

Seepage measurements on the Rio Grande from Lobatos, Colo., to San Marcial, N. Mex.

[Second-feet.]

Date (March, 1911).	Stream.	Place.	Discharge.	Increase in discharge of Rio Grande over that near Lobatos.	Surface contributions between sections.	Surface contribution to Rio Grande between Lobatos and the measured section.	Increase in discharge over surface contribution between Lobatos and measured section.	Remarks.
7	Rio Grande	Lobatos	426	....	....	....	....	
7	Costilla Creek	Mouth	0	....	....	....	....	
7	Latir Creek	.....do	1	....	....	....	....	
8	Rio Colorado	Below Questa.	30	....	....	....	....	
9	Cebolla Creek	Mouth	3	....	....	....	....	Estimated.
10	Rio Grande	Dunn's ranch.	504	168	34	34	134	Good measurement.
9	Rio Hondo	Mouth	13	....	....	....	....	
12	Rio Pueblo de Taos.	Los Cordovas.	50	....	....	....	....	
12	Hondo Creek	Mouth	0	....	....	....	....	
	No Agua	....	....	....	....	....	....	Not visited; no discharge.
13	Embudo Creek	Dixon	68	....	....	....	....	
13	Truchas River	Mouth	0	....	....	....	....	
13	Rio Grande	Velarde	860	434	[a] 131.7	165.7	268.3	No water diverted.
14	.....do	San Juan	863	437	....	165.7	271.3	Good measurement.
14	Rio Chama	Mouth	530	....	....	....	....	
14	Santa Cruz Creek	.....do	26	....	....	....	....	
15	Santa Clara Creek.	.....do	4	....	....	....	....	
15	Pojague Creek	.....do	8	....	....	....	....	
15	Rio Grande	Buckman	1,400	974	568	733.7	240.3	Do.
17	.....do	Cochiti	1,390	964	....	733.7	230.3	Do.
18	Rio Jemes	Mouth	144	....	....	....	....	
18	Rio Grande	Bernalillo	1,590	1,164	144	877.7	286.3	Fair measurement.
20	.....do	Albuquerque	1,775	1,349	....	877.7	471.3	Do.
21	.....do	Belen	1,750	1,324	....	877.7	446.3	Do.
22	Rio Puerco	Mouth	90	....	....	....	....	
23	Rio Salado	.....do	3	....	....	....	....	
23	Alamillo Creek	.....do	0	....	....	....	....	
23	Rio Grande	San Marcial	1,715	1,289	93	970.7	318.3	Good measurement.

[a] Cieneguilla Creek running 0.7 second-foot Mar. 12, 1911.

Daily gage height, in feet, and discharge, in second feet, of Rio Grande near Lobatos, Colo., Buckman, N. Mex., and San Marcial, N. Mex.; Rio Colorado below Questa, N. Mex., and Rio Pueblo de Taos at Los Cordovas, N. Mex., Mar. 7–23, 1911.

Date.	Rio Grande near Lobatos.		Rio Grande near Buckman.		Rio Grande near San Marcial.		Rio Colorado below Questa.		Rio Pueblo de Taos at Los Cordovas.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Mar. 7	1.7	345	5.15	3,440	10.90	620	2.3	....	1.30	45
8	1.65	320	4.15	2,190	11.00	800	2.3	....	1.22	35
9	1.65	320	3.75	1,760	12.45	3,380	2.3	....	1.28	43
10	1.7	345	3.95	1,960	11.50	1,870	2.3	....	1.38	56
11	1.7	345	4.70	2,840	11.35	1,620	2.4	....	1.65	101
12	1.8	400	4.25	2,300	11.40	1,700	2.4	....	1.35	52
13	1.85	430	3.55	1,560	11.55	2,130	2.4	....	1.42	62
14	1.85	430	3.55	1,560	12.10	3,700	2.35	....	1.30	45
15	1.8	400	3.40	1,420	11.25	2,020	2.2	....	1.30	45
16	1.75	372	3.25	1,200	10.75	1,160	2.25	....	1.35	52
17	1.7	345	3.25	1,200	10.80	1,240	2.3	....	1.32	48
18	1.7	345	3.35	1,260	10.85	1,290	2.3	....	1.30	45
19	1.65	320	3.45	1,360	10.95	1,380	2.3	....	1.35	52
20	1.7	345	3.45	1,360	11.05	1,480	2.3	....	1.38	56
21	1.7	345	3.55	1,450	11.05	1,480	2.4	....	1.40	59
22	1.7	345	3.50	1,400	11.15	1,570	2.4	....	1.42	62
23	1.75	372	3.50	1,400	11.30	1,720	2.4	....	1.38	56

RIO GRANDE AT THIRTYMILE BRIDGE, NEAR CREEDE, COLO.

Location.—In the Rio Grande National Forest, about 30 miles west of Creede, in sec. 13, T. 40 N., R. 4 W., half a mile downstream from the dam site of the Farmers' Union Irrigation Co.'s reservoir; 200 feet above mouth of big Squaw Creek.

Records available.—June 18, 1909, to October 4, 1911.

Drainage area.—163 square miles (measured from topographic sheets).

Gage.—Chain gage 200 feet upstream from Thirtymile Bridge; washed out October 5, 1911.

Channel.—Somewhat shifting after high water.

Discharge measurements.—Made from car and cable except during low stages, when they are made by wading.

Winter flow.—Ice causes backwater during the winter months and records are discontinued.

Diversions.—So far as known no water is diverted above the station and therefore the records represent the natural run-off.

Accuracy.—Although the channel shifts somewhat at this station, sufficient measurements have been made to afford a basis for reliable estimates.

Cooperation.—Field data furnished through the courtesy of Mr. O. P. Pennock, of Creede.

Discharge measurements of Rio Grande at Thirtymile Bridge, near Creede, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Apr. 23	O. P. Pennock	3.26	237
May 3	.....do	3.38	254
5	.....do	4.16	462
6	.....do	4.47	577
8	.....do	4.81	681
10	.....do	4.68	609
20	.....do	4.54	571
24	.....do	5.35	914
26	.....do	5.19	827
31	.....do	5.49	958
June 1	B. S. Clayton	5.68	981
3	O. P. Pennock	5.88	1,120
4	.....do	6.18	1,260
6	.....do	6.45	1,490
8	.....do	7.14	1,880
July 25	B. S. Clayton	4.62	551
26	.....do	4.49	507
Aug. 9[a]	Wimmer and French	3.32	182

[a] Poor measurement.

Daily gage height, in feet, of Rio Grande at Thirtymile Bridge, near Creede, Colo., for 1911.

[O. P. Pennock, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	......	3.2	5.95	5.4	3.8	2.8	5.0	16	......	4.35	6.2	5.05	3.3	2.85	......
2	......	3.3	6.0	6.05	3.7	2.8	4.75	17	......	4.65	6.0	4.8	3.15	2.75	......
3	......	3.35	6.05	6.15	3.7	2.85	4.35	18	......	5.0	6.0	4.8	3.1	2.7	......
4	......	3.75	6.35	5.8	3.55	2.85	3.95	19	......	5.05	6.3	5.1	3.05	2.8	......
5	......	4.15	6.6	5.5	3.45	2.8	......	20	......	4.55	6.1	4.95	3.0	2.75	......
6	......	4.4	6.7	5.4	3.4	2.75	......	21	......	4.5	6.4	4.9	3.1	2.65	......
7	......	4.5	6.7	5.4	3.35	2.7	......	22	3.15	4.8	6.2	4.75	3.7	2.65	......
8	......	4.7	7.15	5.2	3.25	2.65	......	23	3.2	5.2	6.1	4.75	3.4	3.25	......
9	......	4.9	7.25	4.95	3.2	2.65	......	24	3.15	5.5	5.9	4.6	3.15	2.8	......
10	......	4.75	6.85	4.85	3.35	2.65	......	25	3.1	5.45	5.6	4.6	3.05	2.7	......
11	......	4.45	6.85	4.7	3.25	2.6	......	26	3.35	5.3	5.5	4.45	3.0	3.35	......
12	......	4.55	6.65	4.65	3.15	2.65	......	27	3.45	5.05	5.6	4.3	3.05	3.3	......
13	......	4.6	6.3	6.05	3.15	3.1	......	28	3.6	5.25	5.6	4.3	3.0	3.2	......
14	......	4.3	6.2	5.6	3.1	2.9	......	29	3.5	5.35	5.4	4.1	2.95	3.35	......
15	......	4.3	6.1	5.3	3.15	2.9	......	30	3.3	5.5	5.7	4.0	2.85	4.3	......
								31	......	5.65	......	3.9	2.8	......	......

Daily discharge, in second-feet, of Rio Grande at Thirtymile Bridge, near Creede, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	213	1,140	880	313	105	697
2	....	235	1,160	1,210	287	105	605
3	....	246	1,190	1,260	287	113	471
4	....	344	1,350	1,080	251	113	353
5	....	458	1,560	930	228	105	....
6	....	537	1,620	880	217	98	....
7	....	571	1,620	880	206	92	....
8	....	641	1,880	790	185	86	....
9	....	715	1,950	678	175	86	....
10	....	659	1,700	641	206	86	....
11	....	554	1,700	587	185	81	....
12	....	588	1,560	570	165	86	....
13	....	605	1,360	1,210	165	155	....
14	....	505	1,300	980	155	121	....
15	....	505	1,240	830	165	121	....
16	....	521	1,300	717	195	113	....
17	....	623	1,180	623	165	98	....
18	....	753	1,180	623	155	92	....
19	....	773	1,360	735	146	105	....
20	....	588	1,240	678	137	98	....
21	....	571	1,410	659	155	86	....
22	203	677	1,300	605	287	86	....
23	213	835	1,240	605	217	185	....
24	203	973	1,140	553	165	105	....
25	193	949	980	553	146	92	....
26	246	879	930	503	137	206	....
27	269	773	980	455	146	195	....
28	305	857	980	455	137	175	....
29	281	902	880	395	129	206	....
30	235	973	1,030	367	113	455	....
31	....	1,050	....	339	105	....	....

NOTE.—Daily discharge Apr. 22 to May 31 and June 5 to 8 determined from a rating curve well defined between 193 and 2,200 second-feet; daily discharge June 1 to 4 and July 25 to Sept. 9, from a curve well defined between 200 and 1,800 second-feet. Daily discharge June 9 to July 24 computed by indirect method for shifting channels.

Monthly discharge of Rio Grande at Thirtymile Bridge, near Creede, Colo., for 1911.

[Drainage area, 163 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
Apr. 22-30	305	193	239	1.47	0.49	4,270	A.
May	1,050	213	648	3.98	4.59	39,800	A.
June	1,950	880	1,320	8.10	9.04	78,600	A.
July	1,260	339	718	4.40	5.07	44,100	A.
August	313	105	185	1.13	1.30	11,400	A.
September	455	81	128	.785	.88	7,620	A.
Oct. 1-4	697	353	532	3.26	.49	4,220	
The period	....	....	....	....	....	190,000	

RIO GRANDE NEAR CREEDE, COLO.

Location.—In the Rio Grande National Forest, at highway bridge in sec. 6, T. 41 N., R. 1 E., one-fourth mile from Wason siding and 3 miles east of Creede. Nearest tributary, Willow or Goblin Creek, enters a short distance upstream.

Records available.—April 24, 1907, to December 31, 1911.

Drainage area.—705 square miles.

Gage.—An automatic recording gage, the property of the State engineer. It is referred to the same datum as the chain gage used previously.

Channel.—Practically permanent.

Discharge measurements.—Made from bridge.

Winter flow.—River frozen over during winter months; ice causes backwater at gage.

Diversions.—Except for a little meadow irrigation no water is diverted above the station. A number of irrigation reservoirs are being constructed above the station; one a short distance above will have a capacity nearly equal to the normal annual flow of the river.

Accuracy.—Good.

Cooperation.—During 1911 this station was maintained in cooperation with the United States Forest Service and the State engineer.

Discharge measurements of Rio Grande near Creede, Colo., in 1911.

Date.	Hydrographer.	Gage height.	dis-charge.
		Feet.	*Sec.-feet.*
Jan. 19[a]	G. H. Russell	0.44	170
Feb. 25[a]	Turner and Clayton	.16	156
Mar. 28	B. S. Clayton	.42	219
Apr. 28	do	1.74	982
May 31	do	3.45	2,560
June 2	do	3.82	3,230
27	O. M. Wimmer	2.90	2,010
July 27	B. S. Clayton	2.40	1,420
Aug. 11	Wimmer and French	1.43	571
Sept. 8	B. S. Clayton	.92	431
Oct. 2	H. B. Waha	2.60	1,840
12	B. S. Clayton	2.17	1,320
Dec. 20[a]	do	.58	220

[a] Ice conditions.

Daily gage height, in feet, of Rio Grande near Creede, Colo., for 1911.

[G. K. Munsell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.2	0.1	0.8	1.45	3.6	3.35	2.0	1.15	2.3	1.1	
2		.25	.1	.85	1.45	3.7	3.75	1.9	1.15	2.3	1.1	
3		.3	.15	.85	1.5	3.65	3.5	1.85	1.15	2.15	1.05	
4		.2	.1	.85	1.75	3.9	3.55	1.8	1.15	1.85	1.0	
5			.1	.75	2.2	4.15	3.15	1.7	1.15	4.55	1.05	
6			.05	.75	2.5	4.3	2.95	1.6	1.1	5.15	1.05	
7			.1	.7	2.55	4.25	3.1	1.55	1.0	3.9	1.0	
8			.1	.75	2.8	4.25	2.95	1.5	1.0	3.25	1.1	
9		.1	.1	.7	3.05	4.6	2.7	1.45	.9	2.75	1.05	
10		.2	.15	.75	3.1	4.45	2.55	1.45	.85	2.5	1.05	
11		.2	.25	.7	2.75	4.3	2.4	1.5	.85	2.35	.95	
12		.2	.2	.75	2.7	4.2	2.35	1.45	.85	2.2	.95	
13		.15	.15	.7	2.7	3.95	2.95	1.45	.85	2.05	.95	
14		.2	.1	.7	2.35	3.9	3.5	1.4	1.0	1.95	1.0	
15		.15	.1	.65	2.3	3.7	3.2	1.4	.95	1.85	.9	
16		.2	.15	.75	2.3	3.75	3.0	1.45	1.1	1.7	.95	
17		.2	.2	.9	2.45	3.7	2.5	1.4	.95	1.65	.95	
18		.25	.15	.8	2.7	3.6	2.55	1.4	.85	1.55	.9	
19	0.45	.2	.15	.9	2.95	3.65	2.45	1.35	.85	1.45		
20		.2	.2	1.05	2.7	3.8	2.45	1.3	.95	1.4		0.58
21		.2	.3	1.15	2.65	3.6	2.45	1.3	.85	1.4		
22		.2	.35	1.25	2.65	3.75	2.4	1.9	.8	1.4		
23		.15	.25	1.3	2.95	3.45	2.4	1.8	.95	1.35		
24		.2	.25	1.25	3.25	3.3	2.4	1.6	.9	1.3		
25		.15	.35	1.25	3.3	3.1	2.4	1.5	.85	1.35		
26		.1	.3	1.4	3.4	2.95	2.4	1.4	1.05	1.3		
27		.05	.25	1.65	3.05	2.9	2.4	1.4	1.2	1.3		
28		.05	.35	1.7	3.05	3.0	2.4	1.4	1.1	1.25		
29			.45	1.8	3.1	2.95	2.3	1.3	1.1	1.2		
30			.55	1.8	3.15	3.2	2.2	1.2	1.7	1.15		
31			.7		3.4		2.1	1.15		1.15		

NOTE.—Gage heights estimated from hydrograph from July 15 to 26. Ice affected the gage heights from Jan. 1 to Feb. 26 and Nov. 19 to Dec. 31.

Daily discharge, in second-feet, of Rio Grande near Creede, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	120	370	728	2,880	2,560	1,120	542	1,380	515
2	120	392	728	3,010	3,070	1,050	542	1,380	515
3	132	392	760	2,940	2,740	1,010	542	1,250	490
4	120	392	938	3,270	2,810	975	542	1,010	465
5	120	348	1,290	3,620	2,310	900	542	4,230	490
6	108	348	1,580	3,840	2,070	830	515	5,170	490
7	120	325	1,630	3,770	2,240	795	465	3,270	465
8	120	348	1,900	3,770	2,070	760	465	2,430	515
9	120	325	2,180	4,310	1,790	728	415	1,840	490
10	132	348	2,240	4,070	1,630	728	392	1,580	490
11	160	325	1,840	3,840	1,480	760	392	1,430	440
12	145	348	1,790	3,700	1,430	728	392	1,290	440
13	132	325	1,790	3,340	2,070	728	392	1,160	440
14	120	325	1,430	3,270	2,740	695	465	1,090	465
15	120	305	1,380	3,010	2,370	695	440	1,010	415
16	132	348	1,380	3,070	2,120	728	515	900	440
17	145	415	1,520	3,010	1,580	695	440	865	440
18	132	370	1,790	2,880	1,630	695	392	795	415
19	132	415	2,070	2,940	1,520	662	392	728	....
20	145	490	1,790	3,140	1,520	630	440	695	....
21	175	542	1,740	2,880	1,520	630	392	695	....
22	192	600	1,740	3,070	1,480	1,050	370	695	....
23	160	630	2,070	2,680	1,480	975	440	662	....
24	160	600	2,430	2,500	1,480	830	415	630	....
25	192	600	2,500	2,240	1,480	760	392	662	....
26	175	695	2,620	2,070	1,480	695	490	630	....
27	160	865	2,180	2,010	1,480	695	570	630	....
28	192	900	2,180	2,120	1,480	695	515	600	....
29	228	975	2,240	2,070	1,380	630	515	570	....
30	265	975	2,310	2,370	1,290	570	900	542	....
31	325	....	2,620	....	1,200	542	....	542	....

NOTE.—Daily discharge Mar. 1 to Nov. 18 determined from a rating curve well defined between 95 and 5,000 second-feet.

Monthly discharge of Rio Grande near Creede, Colo., for 1911.

[Drainage area, 706 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	....	....	150	0.213	0.25	9,220	C.
February	....	....	145	.206	.21	8,050	B.
March	325	108	155	.220	.25	9,530	A.
April	975	305	488	.692	.77	29,000	A.
May	2,620	728	1,790	2.54	2.93	110,000	A.
June	4,310	2,010	3,060	4.34	4.84	182,000	A.
July	3,070	1,200	1,860	2.64	3.04	114,000	A.
August	1,120	542	774	1.10	1.27	47,600	A.
September	900	370	474	.672	.75	28,200	A.
October	5,170	542	1,300	1.84	2.12	79,900	A.
November	515	....	414	.587	.65	24,600	C.
December	....	....	232	.329	.38	14,300	C.
The year	5,170	....	907	1.29	17.46	656,000	

NOTE.—Discharge estimated Jan. 1 to Feb. 28 and Nov. 19 to Dec. 31 on account of ice. Mean discharge Nov. 19 to 30 estimated 333 second-feet.

RIO GRANDE NEAR DEL NORTE, COLO.

Location.—At highway bridge about sec. 30, T. 40 N., R. 5 E., 6 miles west of Del Norte, a short distance below the mouth of West Creek. From October 11, 1889, to November 30, 1906, a station was maintained about 4 miles below the present station. The flow at the two points is not directly comparable as a number of small tributaries enter between.

Records available.—May 16, 1908, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Automatic recording gage, the property of the State engineer. The gage is referred to the same datum as was the chain gage installed May 16, 1908.

Channel.—Slightly shifting.

Discharge measurements.—Made from bridge.

Winter flow.—River is frozen over during the winter months.

Diversions.—There are court decrees for diversions of 51 second-feet from the Rio Grande between the Creede station and Del Norte, and for diversions of 55 second-feet from intervening tributaries.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Rio Grande near Del Norte, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Jan. 20[a]	G. H. Russell	1.98	287
Feb. 26[a]	Clayton and Turner	.68	246
Mar. 29	B. S. Clayton	1.04	431
Apr. 29	.....do	2.55	1,960
June 3	.....do	4.27	5,300
July 5	.....do	3.74	3,850
Sept. 10	C. E. Turner	1.34	565
Oct. 16	B. S. Clayton	2.15	1,390

[a] Ice conditions.

Daily gage height, in feet, of Rio Grande near Del Norte, Colo., for 1911.

[J. G. Duncan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.65	0.65	1.45	2.05	4.1	3.75	2.25	1.6	2.75	1.45	1.15
2		.6	.75	1.45	2.0	4.25	3.85	2.15	1.55	2.9	1.45	1.15
3		.6	.75	1.45	2.1	4.2	4.05	2.2	1.55	2.55	1.45	1.05
4		.65	.75	1.5	2.3	4.35	3.95	2.0	1.55	2.3	1.3	1.05
5		.6	.65	1.4	2.65	4.35	3.6	1.9	1.55	5.4	1.3	1.05
6		.55	.65	1.3	3.1	4.45	3.5	1.8	1.5	6.0	1.3	1.05
7		.65	.6	1.2	3.45	4.45	3.35	1.8	1.4	4.9	1.3	1.05
8		.65	.65	1.2	3.6	4.5	3.3	1.75	1.35	4.1	1.3	1.05
9		.65	.7	1.2	3.95	4.8	3.0	1.6	1.3	3.6	1.3	1.05
10		.7	.85	1.25	3.85	4.75	2.9	1.6	1.3	3.2	1.3	1.05
11		.7	1.0	1.25	3.45	4.65	2.8	1.6	1.3	3.1	1.3	1.0
12		.7	.8	1.3	3.3	4.55	2.7	1.4	1.3	2.8	1.3	1.0
13		.65	.7	1.3	3.3	4.4	2.7	1.6	1.3	2.6	1.3	.9
14		.6	.7	1.2	3.15	4.35	3.8	1.6	1.4	2.4	1.3	.85
15		.65	.65	1.2	3.15	4.15	3.3	1.45	1.4	2.3	1.3	.85
16		.6	.7	1.35	3.15	4.05	3.05	1.5	1.3	2.15	1.3	.95
17		.6	.75	1.65	3.25	3.95	2.9	1.55	1.3	2.1	1.25	.95
18		.6	.8	1.5	3.45	3.85	2.8	1.5	1.3	2.05	1.25	.95
19		.65	.75	1.55	3.65	3.9	2.95	1.55	1.4	1.95	1.25	.95
20	2.0	.6	.85	1.75	3.4	3.95	3.1	1.5	1.5	1.85	1.25	1.05
21		.65	.8	1.95	3.15	4.05	3.05	1.6	1.35	1.7	1.25	1.05
22		.6	1.0	2.1	3.1	4.05	2.9	2.0	1.2	1.7	1.25	1.05
23		.7	.9	2.2	3.3	3.9	2.95	2.15	1.4	1.7	1.25	1.0
24		.65	.8	2.1	3.65	3.9	3.05	1.9	1.45	1.7	1.25	1.0
25		.65	.95	2.0	3.85	3.7	2.9	1.8	1.5	1.7	1.25	1.0
26		.65	.9	2.05	3.95	3.5	3.05	1.7	1.6	1.65	1.25	1.0
27		.6	.75	2.35	3.75	3.45	2.85	1.9	1.8	1.65	.65	1.0
28		.6	.95	2.4	3.75	3.45	2.75	1.8	1.5	1.65	.65	1.05
29	0.7		1.1	2.5	3.75	3.4	2.75	1.8	1.5	1.5	.7	1.05
30	.65		1.25	2.2	3.65	3.45	2.55	1.7	1.6	1.55	1.05	1.0
31	.65		1.35		3.95		2.4	1.6		1.5		.95

NOTE.—Gage heights affected by presence of ice Jan. 1 to Mar. 8 and Nov. 27 to Dec. 31.

Daily discharge, in second-feet, of Rio Grande near Del Norte, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	750	1,320	4,920	3,920	1,820	810	2,190	678
2	....	750	1,260	5,250	4,100	1,400	765	2,420	678
3	....	750	1,370	5,160	4,480	1,460	765	1,910	678
4	....	790	1,650	5,470	4,280	1,220	765	1,580	555
5	....	710	2,150	5,470	3,590	1,110	765	10,700	555
6	....	635	2,870	5,650	3,400	1,000	720	14,000	555
7	....	560	3,470	5,630	3,140	1,000	635	6,370	555
8	....	560	3,740	5,740	3,060	955	595	4,540	555
9	270	560	4,420	6,450	2,570	810	555	3,580	555
10	345	598	4,220	6,250	2,420	810	555	2,900	555
11	425	598	3,480	6,000	2,260	810	555	2,730	555
12	320	635	3,220	5,780	2,120	635	555	2,260	555
13	270	635	3,230	5,450	2,120	810	555	1,980	555
14	270	560	2,980	5,330	3,960	810	635	1,710	555
15	248	560	2,980	4,920	3,060	678	635	1,580	555
16	270	672	3,000	4,680	2,650	720	555	1,400	555
17	295	920	3,180	4,480	2,420	765	555	1,340	518
18	320	790	3,540	4,280	2,260	720	555	1,280	518
19	295	832	3,920	4,350	2,490	765	635	1,160	518
20	345	1,010	3,450	4,450	2,730	720	720	1,060	518
21	320	1,210	3,030	4,630	2,650	810	595	905	518
22	425	1,370	2,950	4,620	2,420	1,220	480	905	518
23	370	1,490	3,320	4,330	2,490	1,400	635	905	518
24	320	1,370	3,950	4,310	2,650	1,110	678	905	518
25	398	1,260	4,350	3,910	2,420	1,000	720	905	518
26	370	1,320	4,560	3,500	2,650	905	810	858	518
27	295	1,690	4,200	3,410	2,340	1,110	1,000	858	....
28	398	1,760	4,200	3,410	2,190	1,000	720	858	....
29	490	1,900	4,200	3,280	2,190	1,000	720	720	....
30	598	1,490	4,040	3,380	1,910	905	810	765	....
31	672	....	4,620	....	1,710	810	....	720	....

NOTE.—Daily discharge Mar. 9 to Apr. 29 determined from the 1910 rating curve; discharge Apr. 30 to July 5 obtained by indirect method for shifting channels; discharge July 6 to Nov. 26 determined from a rating curve well defined between 415 and 4,340 second-feet.

Monthly discharge of Rio Grande near Del Norte, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	248	15,200	C.
February	....	....	239	13,300	B.
March	672	....	336	20,700	A.
April	1,900	560	958	57,000	A.
May	4,620	1,260	3,320	204,000	A.
June	6,450	3,280	4,820	287,000	A.
July	4,480	1,710	2,800	172,000	A.
August	1,820	635	967	59,500	A.
September	1,000	555	668	39,700	A.
October	14,000	720	2,450	151,000	A.
November	678	....	543	32,300	A.
December	....	....	407	25,000	B.
The year	14,000	....	1,490	1,080,000	

NOTE.—Discharge Jan. 1 to Mar. 8 and Nov. 27 to Dec. 31 estimated on account of ice.

Mean discharge Mar. 1–8 estimated 261 second-feet; mean discharge Nov. 27–30 estimated 465 second-feet.

RIO GRANDE NEAR LOBATOS, COLO.[1]

Location.—At highway bridge in sec. 22, T. 33 N., R. 11 E., 10 miles east of Lobatos, and a few miles above the Colorado-New Mexico line; 7 miles below mouth of Conejos River.

Records available.—June 28, 1899, to November 6, 1911.

Drainage area.—7,700 square miles.

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[1] Originally known as Rio Grande at Cenicero, Colo.

Gage.—Automatic recording gage, the property of the State engineer. This gage is referred to the datum of the original gage.

Channel.—A gash cut in lava rock; fairly permanent.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater varying in amount during the three winter months.

Diversions.—There are court decrees for diversions from the Rio Grande of 2,912 second-feet between the Del Norte station and this one. Nearly 300,000 acres are being irrigated in the Rio Grande basin in Colorado.

Cooperation.—During 1911 station was maintained in cooperation with the State engineer.

Discharge measurements of Rio Grande near Lobatos, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Jan. 26[a]	G. H. Russell	1.94	449
Feb. 23[a]	Clayton and Turner	2.00	331
Mar. 7	G. H. Russell	1.73	426
27	B. S. Clayton	1.70	385
Apr. 19	G. H. Russell	1.38	194
27	B. S. Clayton	2.57	1,140
May 29	.....do	3.62	2,310
July 3	.....do	4.81	3,900
Sept. 2	I. G. Ferguson	2.40	833
7	B. S. Clayton	2.25	719
Oct. 9	.....do	6.72	7,100
18	.....do	3.62	2,280

[a] Ice conditions.

Daily gage height, in feet, of Rio Grande near Lobatos, Colo., for 1911.

[C. E. Mondragon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	2.1	1.8	1.9	1.7	2.7	....	3.45	3.55	2.4	2.7	2.9
2	....	1.8	1.9	1.7	2.5	....	3.75	3.3	2.35	3.4	2.8
3	....	1.8	1.9	1.75	2.4	....	4.6	2.9	2.25	3.9	2.8
4	....	1.8	2.0	1.8	2.55	....	5.0	2.6	2.2	4.0	2.7
5	....	1.9	1.8	1.8	2.75	....	5.4	2.3	2.2	4.05	2.6
6	....	1.8	1.8	1.75	3.05	....	5.5	2.1	2.15	4.95	2.6
7	....	1.7	1.7	1.65	3.4	4.9	5.5	1.8	2.2	6.65	....
8	....	1.7	1.65	1.6	3.85	4.95	5.3	1.5	2.15	6.6	....
9	....	1.7	1.65	1.55	4.35	5.15	5.05	1.35	2.1	6.6	....
10	....	1.6	1.7	1.5	4.75	5.45	4.85	1.2	2.0	6.95	....
11	....	1.6	1.7	1.45	4.8	5.65	4.5	1.2	1.9	6.55	....
12	....	1.6	1.8	1.45	4.5	5.8	4.2	1.1	1.95	5.9	....
13	....	1.7	1.85	1.4	3.95	5.9	4.05	1.0	1.9	5.25	....
14	....	1.7	1.85	1.4	3.5	5.7	4.05	.95	1.95	4.7	....
15	2.1	1.7	1.8	1.25	3.5	5.35	4.3	.95	2.1	4.3	....
16	2.1	1.7	1.75	1.25	3.5	5.25	4.55	.95	2.15	3.9	....
17	2.0	1.8	1.7	1.2	3.4	5.05	4.55	.90	2.15	3.7	....
18	2.0	1.8	1.7	1.3	3.25	4.9	4.45	1.05	2.15	3.6	....
19	2.0	1.4	1.65	1.35	3.3	4.7	4.35	1.05	2.1	3.55	....
20	1.8	1.8	1.7	1.4	3.5	4.7	4.55	1.05	2.1	3.45	....
21	1.8	1.8	1.7	1.45	3.45	4.7	4.7	1.05	2.25	3.3	....
22	1.8	2.1	1.7	1.65	3.15	4.9	4.9	1.15	2.35	3.15	....
23	1.8	2.0	1.75	1.95	2.9	5.2	4.7	1.25	2.35	3.1	....
24	1.8	2.0	1.8	2.15	2.9	5.3	4.5	1.95	2.3	3.1	....
25	1.9	2.0	1.8	2.2	....	5.3	4.45	2.5	2.2	3.0	....
26	1.9	2.0	1.75	2.2	....	4.9	4.45	2.45	2.2	3.0	....
27	1.9	2.0	1.7	2.6	....	4.3	4.3	2.5	2.2	2.95	....
28	1.8	2.0	1.65	2.9	....	4.15	4.3	2.5	2.3	3.0	....
29	1.7	....	1.65	2.95	3.6	3.7	4.3	2.6	2.45	3.05	....
30	1.7	....	1.65	3.0	....	3.55	4.0	2.65	2.55	3.0	....
31	1.8	....	1.65	....	....	....	3.8	2.5	....	2.95	....

NOTE.—Gage heights affected by presence of ice Jan. 1 to Feb. 28 and Nov. 7 to Dec. 31.

Daily discharge, in second-feet, of Rio Grande near Lobatos, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	460	345	1,200	2,780	2,065	2,195	900	1,200	1,410
2	460	345	1,000	2,960	2,460	1,870	850	2,000	1,300
3	460	372	900	3,150	3,700	1,410	752	2,670	1,300
4	530	400	1,050	3,340	4,310	1,100	705	2,810	1,200
5	400	400	1,250	3,520	4,950	800	705	2,880	1,100
6	400	372	1,575	3,710	5,110	615	660	4,230	1,100
7	345	320	2,000	4,150	5,110	400	705	6,975	....
8	320	295	2,600	4,230	4,790	250	660	6,890	....
9	320	272	3,325	4,550	4,390	185	615	6,890	....
10	345	250	3,925	5,030	4,075	135	530	7,510	....
11	345	228	4,000	5,350	3,550	135	460	6,805	....
12	400	228	3,550	5,590	3,100	110	495	5,750	....
13	430	205	2,740	5,750	2,880	85	460	4,710	....
14	430	205	2,130	5,430	2,880	75	495	3,850	....
15	400	150	2,130	4,870	3,250	75	615	3,250	....
16	372	150	2,130	4,710	3,625	75	660	2,670	....
17	345	135	2,000	4,390	3,625	65	660	2,390	....
18	345	165	1,810	4,150	3,475	98	660	2,260	....
19	320	185	1,870	3,850	3,325	98	615	2,195	....
20	345	205	2,130	3,850	3,625	98	615	2,065	....
21	345	228	2,065	3,850	3,850	98	752	1,870	....
22	345	320	1,690	4,150	4,150	122	850	1,690	....
23	372	490	1,410	4,630	3,850	150	850	1,630	....
24	400	660	1,410	4,790	3,550	495	800	1,630	....
25	400	705	1,650	4,790	3,475	1,000	705	1,520	....
26	372	705	1,810	4,150	3,475	950	705	1,520	....
27	345	1,100	1,980	3,250	3,250	1,000	705	1,465	....
28	320	1,410	2,140	3,025	3,250	1,000	800	1,520	....
29	320	1,465	2,320	2,390	3,250	1,100	950	1,575	....
30	320	1,520	2,410	2,195	2,810	1,150	1,050	1,520	....
31	320	....	2,590	....	2,530	1,000	....	1,465	....

NOTE.—Discharge Mar. 1 to Nov. 6 determined from a rating curve well defined between 200 and 7,600 second-feet; discharge May 25 to 28, and May 30 to June 6 estimated for days on which gage heights are missing.

Monthly discharge of Rio Grande near Lobatos, Colo., for 1911.

[Drainage area, 7,700 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	....	....	370	0.048	0.06	22,800
February	....	....	380	.049	.05	21,100
March	530	320	375	.049	.06	23,100
April	1,520	135	461	.060	.07	27,400
May	4,000	900	2,090	.271	.31	129,000
June	5,750	2,195	4,090	.531	.59	243,000
July	5,110	2,065	3,600	.468	.54	222,000
August	2,195	65	579	.075	.09	35,600
September	1,050	460	699	.091	.10	41,600
October	7,510	1,200	3,140	.408	.47	193,000
November 1-6	1,410	1,100	1,240	.174	.04	14,700
The period	....	....	....	....	....	973,000

NOTE.—Discharge January and February estimated on account of ice.

RIO GRANDE NEAR BUCKMAN, N. MEX.[1]

Location.—At the Denver & Rio Grande Railroad bridge 4 miles above Buckman and 2 miles below the Indian village of San Ildefonso about sec. 18, T. 19 N., R. 8 E. The nearest stream is Tesuque Creek, which enters near San Ildefonso. There is an arroyo just above the station.

Records available.—February 1, 1895, to December 31, 1905; June 23, 1909, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Automatic recording gage installed in June, 1910. The original gage was located on the left bank 180 feet above the bridge. On March 30, 1904, a vertical staff gage was established at a new datum at the bridge. The same gage was used when the station was reestablished in 1909; the datum of the gage is the same as that of the original gage.

Channel.—Shifting during high water, but fairly permanent at other times.

Discharge measurements.—Made from car and cable 3 miles below the gage. No diversions or important tributaries between two points.

Winter flow.—Only slightly affected by ice.

Diversions.—For many miles above the station many large and small ditches divert water for irrigation.

Accuracy.—Prior to the flood in October conditions were favorable for accurate results, but the flood caused considerable change, which was not fully covered by field work. Thus the estimates for October to December can not be considered better than fair.

Cooperation.—During 1911 station was maintained in cooperation with the Territorial engineer.

Discharge measurements of Rio Grande near Buckman, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Feb. 8	C. B. Digby	[a] 2.50	725
Mar. 15	G. H. Russell	3.38	1,400
Apr. 15	R. L. Cooper	3.45	1,250
May 4	Freeman and Waha	5.80	4,420
17	W. B. Freeman	7.35	7,200
June 12	R. L. Cooper	7.35	6,970
Aug. 5	W. B. Freeman	4.15	2,010
Oct. 30	A. S. Kirkpatrick	4.50	3,410

[a] Gage not read. Gage height determined from the automatic gage sheet.

Daily gage height, in feet, of Rio Grande near Buckman, N. Mex., for 1911.

[Territorial engineer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.25	3.05	2.55	4.05		6.4	5.15	5.6	2.8	5.1	4.3	3.2
2	2.1	2.95	2.65	4.1		6.45	5.5	5.3	3.25	5.0	4.3	3.2
3	2.1	2.9	2.75	4.25		6.65	6.05	4.9	3.31	5.1	4.15	3.2
4	2.1	2.6	2.8	4.3	5.85	6.7	6.5	4.45	3.43	5.2	4.15	3.2
5	2.15	2.65	3.05	4.3	6.3	6.75	6.85	4.2	3.37	5.4	4.1	3.2
6	2.15	2.65	4.1	4.2	6.75	6.8	7.0	3.85	3.27	5.6	4.0	3.2
7	2.0	2.55	5.15	3.95	7.3	6.85	7.3	3.7	3.17	8.4	3.95	3.2
8		2.5	4.15	3.85	8.0	6.8	7.25	3.35	3.09	11.0	3.9	3.2
9		2.5	3.75	3.7	8.6	6.9	6.85	3.1	3.06	9.2	3.95	3.2
10		2.5	3.95	3.5	8.95	7.0	6.5	2.85	3.02	8.4	3.9	3.2

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[1] In earlier reports this station was designated as near Rio Grande and at Watertank.

Daily gage height, in feet, of Rio Grande near Buckman, N. Mex., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	......	2.5	4.7	3.4	8.7	7.3	6.45	2.6	2.98	7.8	3.9	3.2
12	......	2.45	4.25	3.45	8.8	7.4	6.0	2.65	2.81	7.2	3.7	3.1
13	......	2.4	3.55	3.55	7.9	7.45	5.9	2.9	2.77	6.8	3.6	3.1
14	3.5	2.4	3.55	3.5	7.7	7.5	6.1	2.7	2.82	6.5	3.6	3.1
15	3.0	2.4	3.4	3.4	7.85	7.4	6.1	2.45	2.92	6.1	3.6	3.0
16	2.8	2.4	3.25	......	7.8	7.15	6.2	2.3	3.13	......	3.6	2.85
17	2.9	2.45	3.25	......	7.45	6.85	6.95	2.3	3.05	......	3.65	2.85
18	2.9	2.4	3.35	......	7.2	6.7	6.35	2.3	3.01	......	3.7	2.85
19	2.7	2.4	3.45	......	7.1	6.5	6.9	2.3	2.96	......	3.65	2.85
20	2.6	2.25	3.45	......	6.95	6.35	7.9	2.35	2.93	......	3.6	2.85
21	2.5	2.25	3.55	......	6.75	6.35	7.15	2.35	3.24	......	3.6	2.85
22	2.6	2.25	3.5	4.5	6.35	6.45	7.7	2.4	3.11	......	3.6	2.85
23	2.6	2.25	3.5	......	6.15	6.6	7.2	2.4	3.17	......	3.65	2.85
24	2.55	2.3	3.25	......	5.95	6.75	7.6	2.7	3.17	......	3.6	2.9
25	2.55	2.45	3.1	......	6.1	6.8	7.4	2.9	3.15	......	3.5	2.9
26	2.6	2.5	3.2	......	6.15	6.6	6.85	2.6	3.1	......	3.4	2.85
27	2.85	2.45	3.2	......	6.45	6.25	6.7	2.5	3.05	......	3.3	2.9
28	2.85	2.5	3.05	......	6.5	5.8	6.5	2.5	3.35	......	3.3	2.9
29	2.65	......	3.15	6.35	6.4	5.45	6.75	2.6	3.27	......	3.25	2.9
30	2.75	......	3.45	......	6.4	5.15	6.35	2.7	4.2	4.45	3.25	2.9
31	3.0	......	3.65	......	6.4	......	5.9	2.7	......	4.4	......	2.9

NOTE.—Fries automatic gage removed Apr. 16 and replaced by a Barrett & Lawrence automatic gage May 4. Gage readings Apr. 22 and 29 refer to the staff gage attached to the float box. From Aug. 17 to Sept. 2 and Sept. 23 to Oct. 29, the automatic gage did not record satisfactorily. Gage heights Aug. 17 to Sept. 2 and Sept. 23 to Oct. 15 have been estimated from a hydrograph of the Rio Grande at Lobatos, with an additional allowance for tributary streams between Lobatos and Buckman. The crest gage height on Oct. 8 was 13.1 feet, as obtained from the automatic sheet.

Daily discharge, in second-feet, of Rio Grande near Buckman, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	602	1,130	775	1,920	5,020	5,200	3,240	3,900	835	3,170	3,010	1,510
2	525	1,050	838	2,000	4,860	5,290	3,750	3,460	1,160	3,030	3,010	1,510
3	525	1,020	905	2,180	4,700	5,650	4,610	2,900	1,210	3,170	2,800	1,510
4	525	805	940	2,220	4,540	5,740	5,380	2,320	1,310	3,310	2,800	1,510
5	550	838	1,130	2,300	5,260	5,830	6,020	2,040	1,260	3,600	2,740	1,510
6	550	838	2,130	2,200	6,080	5,920	6,300	1,680	1,180	3,900	2,600	1,510
7	480	775	3,440	1,920	7,140	6,020	6,890	1,540	1,100	9,260	2,550	1,510
8	500	745	2,190	1,800	8,630	5,920	6,790	1,240	1,040	15,600	2,500	1,420
9	500	745	1,760	1,750	9,990	6,110	6,020	1,040	1,020	13,000	2,550	1,420
10	500	745	1,960	1,460	10,800	6,300	5,380	868	985	11,000	2,500	1,420
11	500	745	2,840	1,380	10,200	6,890	5,290	710	956	9,640	2,500	1,420
12	500	715	2,300	1,430	9,300	7,090	4,530	740	842	8,300	2,250	1,350
13	1,000	685	1,560	1,550	8,410	7,200	4,370	900	816	7,450	2,050	1,350
14	1,510	685	1,560	1,460	7,970	7,300	4,690	770	848	6,830	2,050	1,350
15	1,090	685	1,420	1,380	8,300	7,090	4,690	622	914	6,060	2,050	1,260
16	940	685	1,200	1,540	8,190	6,590	4,860	540	1,070	5,500	2,050	1,160
17	1,020	715	1,200	1,700	7,440	6,020	6,200	540	1,010	5,000	2,100	1,160
18	1,020	685	1,260	1,870	6,940	5,740	5,120	540	978	4,500	2,150	1,160
19	870	685	1,360	2,040	6,740	5,380	6,110	540	942	4,000	2,100	1,160
20	805	602	1,360	2,210	6,460	5,120	8,150	568	921	4,000	2,050	1,050
21	745	602	1,450	2,380	6,080	5,120	6,590	568	1,150	4,000	2,050	1,050
22	805	602	1,400	2,550	5,350	5,290	7,720	505	1,050	3,700	2,050	1,050
23	805	602	1,400	2,950	5,000	5,560	6,690	595	1,100	3,700	2,100	1,050
24	775	630	1,200	3,350	4,660	5,830	7,510	770	1,100	3,700	2,050	1,100
25	775	715	1,080	3,750	4,920	5,920	7,090	900	1,080	3,700	1,920	1,100
26	805	745	1,160	4,150	5,000	5,560	6,020	710	1,040	3,500	1,730	1,050
27	978	715	1,160	4,550	5,530	4,940	5,740	650	1,010	3,500	1,630	1,100
28	978	745	1,050	4,950	5,620	4,210	5,380	650	1,240	3,500	1,630	1,100
29	838	......	1,130	5,350	5,440	3,680	5,830	710	1,180	3,500	1,550	1,100
30	905	......	1,360	5,180	5,440	3,240	5,120	770	2,040	3,340	1,550	1,050
31	1,090	......	1,550	......	5,440	......	4,370	770	......	3,260	......	1,010

NOTE.—Daily discharge Jan. 1 to Mar. 15, and May 5 to 31, June 1 to Oct. 8, and Oct. 9–15 determined from three fairly well-defined rating curves. Daily discharge Mar. 16 to May 4 and Oct. 30 to Dec. 31 determined by the indirect method for shifting channels. Discharge Jan. 8 to 13 and Oct. 16 to 29 estimated; discharge Apr. 16–21, 23–28, and Apr. 30 to May 3 interpolated.

Monthly discharge of Rio Grande near Buckman, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1,510	480	775	47,700	B.
February	1,130	602	748	41,500	B.
March	3,440	775	1,490	91,600	B.
April	5,350	1,380	2,520	150,000	C.
May	10,800	4,540	6,630	408 000	B.
June	7,300	3,240	5,720	340,000	B.
July	8,150	3,240	5,690	350,000	B.
August	3,900	540	1,130	69,500	B.
September	2,040	816	1,080	64,300	B.
October	15,600	3,030	5,470	336,000	C.
November	3,010	1,550	2,220	132,000	B.
December	1,510	1,010	1,260	77,500	C.
The year	15,600	480	2,910	2,110,000	

RIO GRANDE NEAR SAN MARCIAL, N. MEX.

Location.—At the Atchison, Topeka & Santa Fe Railway bridge, 1 mile south of San Marcial, N. Mex. No important tributaries enter in the immediate vicinity of the station.

Records available.—January 29, 1895, to December 31, 1911.

Gage.—Inclined gage established January 29, 1895, and carried away by flood in 1896, and a wire gage established in its place at the same datum; this was soon abandoned and gage heights have since been measured with a graduated rod from the bridge deck to the water surface. The gage datum of the inclined staff and wire gages is still used.

Channel.—Sandy and very shifting; a number of bridge piers interfere with the accuracy of discharge measurements, but not with gage-height fluctuations.

Discharge measurements.—Made from the downstream side of bridge.

Cooperation.—Station operated since 1901 by the United States section of the International Boundary Commission.

Discharge measurements of Rio Grande near San Marcial, N. Mex., in 1911.

[By G. W. King.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 10	10.5	41	Apr. 3	11.3	1,289
Jan. 11	10.8	542	Apr. 6	11.5	1,653
Jan. 14	11.0	595	Apr. 9	11.4	1,672
Jan. 17	11.0	793	Apr. 12	11.0	1,032
Jan. 22	10.9	749	Apr. 15	11.1	971
Jan. 25	10.7	643	Apr. 18	11.2	1,034
Jan. 28	10.6	578	Apr. 21	11.1	928
Jan. 31	10.9	784	Apr. 25	12.0	2,403
Feb. 3	10.7	847	Apr. 28	12.0	2,938
Feb. 6	10.9	795	Apr. 30	12.5	3,684
Feb. 9	10.8	669	May 3	12.3	3,707
Feb. 12	10.7	582	May 6	12.3	3,754
Feb. 15	10.8	522	May 9	13.0	5,281
Feb. 18	10.9	655	May 12	13.5	8,103
Feb. 22	10.8	680	May 16	13.0	6,508
Feb. 25	10.7	466	May 19	12.5	5,654
Mar. 1	10.8	468	May 22	12.4	5,219
Mar. 4	10.9	626	May 25	11.7	3,540
Mar. 7	10.9	620	May 28	12.0	3,817
Mar. 9	12.6	3,649	May 31	12.2	4,073
Mar. 12	11.4	1,699	June 3	12.0	4,067
Mar. 14	11.9	3,130	June 6	12.5	4,517
Mar. 17	10.8	1,245	June 9	12.2	4,290
Mar. 20	11.0	1,428	June 13	12.6	5,218
Mar. 23	11.3	1,716	June 16	12.7	5,817
Mar. 31	10.8	836	June 19	12.5	4,574

Discharge measurements of Rio Grande near San Marcial, N. Mex., in 1911—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 22	12.3	4,217	Sept. 30	10.7	1,285
June 25	11.8	3,968	Oct. 3	11.4	2,117
June 27	12.5	4,163	Oct. 6	12.95	5,300
June 30	12.1	3,267	Oct. 7	14.2	11,301
July 3	14.0	8,426	Oct. 10	14.0	11,528
July 6	11.9	5,702	Oct. 13	13.2	9,435
July 10	12.7	5,750	Oct. 16	12.1	4,799
July 14	12.8	6,000	Oct. 19	11.3	3,215
July 15	13.6	10,200	Oct. 22	11.3	3,046
July 19	12.5	5,997	Oct. 25	11.1	2,527
July 22	13.2	9,874	Oct. 29	11.6	3,745
July 27	12.9	7,456	Oct. 31	11.5	3,066
July 29	12.0	5,007	Nov. 3	11.6	2,670
July 31	12.0	4,871	Nov. 6	11.5	2,361
Aug. 3	11.2	3,201	Nov. 9	11.3	2,329
Aug. 6	10.4	1,290	Nov. 12	11.2	2,175
Aug. 10	9.9	641	Nov. 15	11.1	1,611
Aug. 13	9.4	283	Nov. 18	11.1	1,536
Aug. 16	8.9	28	Nov. 21	11.1	1,466
Aug. 19	9.6	381	Nov. 24	11.0	1,597
Aug. 22	9.4	289	Nov. 27	11.0	1,467
Aug. 25	10.0	810	Nov. 30	10.9	1,334
Aug. 28	10.1	821	Dec. 3	10.5	818
Aug. 31	10.1	673	Dec. 6	11.0	1,278
Sept. 3	10.0	609	Dec. 9	11.1	1,403
Sept. 6	9.9	546	Dec. 12	11.1	1,276
Sept. 9	9.9	556	Dec. 15	10.9	1,028
Sept. 12	9.9	609	Dec. 19	10.9	968
Sept. 15	9.9	479	Dec. 22	11.0	945
Sept. 18	9.9	503	Dec. 25	10.8	781
Sept. 21	10.4	1,000	Dec. 28	10.6	428
Sept. 24	9.9	564	Dec. 31	10.6	204
Sept. 27	10.2	654			

Daily gage height, in feet, of Rio Grande near San Marcial, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.5	10.75	10.8	10.95	12.6	11.95	11.95	11.85	9.9	11.3	11.55	10.75
2	10.2	10.7	10.9	11.15	12.35	12.3	11.8	11.5	9.95	10.7	11.55	10.75
3	......	10.7	11.0	11.3	12.2	12.4	14.0	11.2	10.0	11.3	11.6	10.6
4	......	10.85	10.9	11.4	12.1	12.2	14.1	10.95	10.05	11.7	11.6	10.65
5	......	11.05	10.8	11.5	12.05	12.5	12.45	10.75	9.9	11.95	11.6	10.85
6	......	10.9	10.85	11.45	12.2	12.5	11.95	10.45	9.9	13.5	11.5	10.95
7	......	10.9	10.9	11.55	12.3	12.35	12.3	10.3	9.95	14.3	11.4	11.0
8	......	10.85	11.0	11.5	12.7	12.3	12.55	10.3	9.95	13.95	11.45	10.95
9	......	10.85	12.45	11.4	12.9	12.2	12.35	10.15	9.95	13.75	11.3	11.05
10	10.5	10.8	11.5	11.25	13.2	12.35	12.55	9.95	9.9	14.0	11.3	11.05
11	10.8	10.75	11.35	11.05	13.45	12.4	12.25	9.75	10.05	13.55	11.25	11.1
12	10.9	10.7	11.4	11.0	13.5	12.45	12.2	9.55	9.95	13.35	11.2	11.05
13	11.0	10.6	11.55	11.05	13.45	12.6	12.05	9.4	9.95	13.3	11.25	10.95
14	11.1	10.6	12.1	11.0	13.2	12.7	12.45	9.4	10.0	12.85	11.15	10.85
15	11.2	10.75	11.25	11.05	12.9	12.85	12.85	9.25	10.0	12.7	11.1	10.9
16	11.15	10.8	10.75	11.15	12.9	12.75	12.0	9.0	9.95	12.3	11.15	10.9
17	11.05	10.9	10.8	11.2	12.65	12.6	11.7	8.9	10.0	11.75	11.05	10.95
18	11.05	10.9	10.85	11.15	12.7	12.9	12.95	8.75	9.9	11.55	11.1	10.9
19	11.0	10.9	10.95	11.1	12.55	12.5	12.4	9.15	9.9	11.35	11.1	10.85
20	11.05	10.75	11.05	11.15	12.45	12.3	12.25	9.5	10.3	11.2	11.15	10.85
21	10.95	10.75	11.05	11.1	12.45	12.3	13.45	9.4	10.4	11.15	11.1	10.9
22	10.9	10.75	11.15	11.05	12.4	12.3	13.15	9.35	10.4	11.25	11.2	10.95
23	10.85	10.8	11.3	11.1	12.1	12.3	13.45	9.9	10.05	11.05	11.05	11.0
24	10.75	10.8	11.4	11.45	11.85	11.95	12.65	10.4	9.9	11.1	11.05	10.85
25	10.75	10.7	11.4	11.95	11.75	11.85	12.8	10.05	10.05	11.1	11.1	10.8
26	10.75	10.7	11.35	12.0	11.7	11.85	12.85	10.15	9.95	11.05	11.2	10.75
27	10.7	10.7	11.25	11.95	11.75	12.45	12.8	10.0	10.25	11.1	11.05	10.65
28	10.65	10.7	11.15	12.0	11.9	12.25	12.2	10.1	10.2	11.2	10.95	10.55
29	10.55	......	11.0	12.25	12.0	12.1	12.0	10.1	10.4	11.4	10.85	10.55
30	10.75	......	10.9	12.6	12.15	12.05	12.05	10.1	10.7	11.35	10.85	10.45
31	10.9	......	10.8	......	12.25	......	12.0	10.1	......	11.5	......	10.55

NOTE.—No flow Jan. 3-9.

Daily discharge, in second-feet, of Rio Grande near San Marcial, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	350	740	[a]470	970	3,830	3,950	3,040	4,560	545	2,000	2,980	1,140
2	170	770	570	1,150	3,730	4,390	2,820	3,830	575	1,280	2,760	1,140
3	0	[a]850	670	[a]1,290	[a]3,670	[a]4,520	[a]8,430	[a]3,200	[a]610	[a]2,000	[a]2,670	[a]950
4	0	895	[a]625	1,470	3,420	4,250	8,630	2,600	640	2,730	2,650	955
5	0	985	545	1,650	3,360	4,520	6,440	2,090	545	3,240	2,680	1,140
6	0	[a]795	585	[a]1,560	[a]3,610	[a]4,520	[a]5,770	[a]1,390	[a]545	[a]7,940	[a]2,360	[a]1,230
7	0	795	[a]620	1,740	3,750	4,400	5,910	1,150	575	11,780	2,340	1,280
8	0	730	800	1,720	4,630	4,370	5,980	1,120	575	10,640	2,350	1,220
9	0	[a]730	[a]3,380	[a]1,670	[a]5,060	[a]4,290	5,590	930	[a]575	10,180	[a]2,330	[a]1,340
10	[a]40	670	1,870	1,430	6,340	4,600	[a]5,600	[a]690	575	[a]11,530	2,330	1,300
11	[a]540	620	1,620	1,110	7,570	4,750	5,300	535	680	10,350	2,250	1,320
12	570	[a]580	[a]1,700	[a]1,030	[a]8,100	4,910	5,250	390	[a]640	9,830	[a]2,170	[a]1,220
13	600	480	2,130	1,030	7,940	[a]5,220	5,100	[a]280	595	[a]9,690	2,150	1,090
14	[a]625	440	[a]3,700	925	7,150	5,520	[a]5,580	280	585	7,940	1,830	965
15	760	[a]490	2,020	920	6,190	5,970	[a]6,270	205	[a]540	7,050	[a]1,610	[a]1,030
16	800	540	1,160	1,000	[a]6,190	[a]5,870	5,230	[a]80	515	5,400	1,690	1,010
17	[a]820	640	[a]1,240	1,030	5,910	5,720	4,780	30	555	4,110	1,460	1,050
18	815	[a]655	1,290	[a]1,000	6,000	6,120	7,720	15	[a]505	3,710	[a]1,540	965
19	795	680	1,380	950	[a]5,740	[a]4,570	[a]5,850	[a]185	505	[a]3,310	1,510	[a]920
20	815	585	[a]1,480	975	5,480	4,320	5,620	335	900	2,910	1,590	875
21	770	615	1,480	[a]930	5,400	4,270	11,000	290	[a]1,000	2,730	[a]1,470	885
22	[a]750	[a]640	1,570	890	[a]5,220	[a]4,220	[a]9,650	[a]265	1,000	[a]2,920	1,780	[a]895
23	725	635	[a]1,720	970	4,530	4,220	10,870	725	695	2,400	1,590	945
24	670	590	1,820	1,530	3,930	4,040	8,030	1,160	[a]565	2,530	[a]1,690	820
25	[a]670	[a]465	1,820	[a]2,330	[a]3,640	[a]3,990	8,040	[a]855	610	[a]2,530	1,700	[a]780
26	675	460	1,710	2,580	3,540	3,980	7,750	885	580	2,410	1,810	675
27	645	450	1,550	2,680	3,590	[a]4,150	[a]7,160	780	[a]670	2,530	[a]1,540	535
28	[a]610	440	1,390	[a]2,940	[a]3,720	3,690	5,550	[a]820	655	2,770	1,400	[a]390
29	545	....	1,160	3,310	3,820	3,370	[a]5,010	770	905	[a]3,260	1,270	315
30	680	....	1,000	3,830	4,010	[a]3,190	4,990	725	[a]1,285	2,910	[a]1,270	160
31	[a]785	....	[a]835	....	4,140	....	[a]4,870	[a]675	....	[a]3,070	....	[a]165

[a] Date of measurement.

Monthly discharge of Rio Grande near San Marcial, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	820	0	491	30,198
February	985	440	642	35,633
March	3,700	470	1,416	87,094
April	3,830	890	1,554	92,450
May	8,100	3,360	4,942	303,888
June	6,120	3,190	4,580	269,554
July	11,000	2,820	6,382	392,390
August	4,560	15	1,027	63,164
September	1,285	505	658	39,164
October	11,780	1,280	5,086	312,754
November	2,980	1,270	1,957	116,469
December	1,340	160	927	56,975
The year	11,780	0	2,490	1,799,733

RIO GRANDE NEAR EL PASO, TEX.

Location.—Courchesne's limekiln, about 4 miles north of El Paso.

Records available.—May 10, 1889, to June 30, 1893, and January 25, 1895, to December 31, 1911.

Gage.—Inclined rod bolted to steel piers set with cement in holes drilled in solid rock 60 feet upstream from pumping station. Originally located at Old Fort Bliss about 1,500 feet above the Mexican dam; maintained 1889 to 1893. Reestablished 1895 1½ miles farther upstream and 3 miles north of El Paso; maintained until April 30, 1897. Moved 1 mile farther upstream to its present location

May 1, 1897. Gage heights at the kiln measured at the masonry pump foundation pier with a graduated rod until October, 1902, when the pier was torn down. From October, 1902, to August 19, 1906, an inclined wooden gage 60 feet above the pier was used. Subsequent to August 19, 1906, a gage 300 feet below the inclined gage has been used. Datum of gages at the kiln has remained unchanged.

Channel.—Bed is unstable and channel shifts. Left bank is the loose rock embankment of the Atchison, Topeka & Santa Fe Railway; right bank is of made ground and subject to inundation by floods.

Discharge measurements.—Made from cable.

Cooperation.—Station operated by the United States section of the International Boundary Commission since May 1, 1897.

Discharge measurements of Rio Grande near El Paso, Tex., in 1911.

[By W. L. Follett, E. G. Piper, and W. C. Stewart.]

Date.	Gage height.	Discharge.	Date.	Gage. height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 6	6.5	8	July 11	13.5	8,800
Jan. 17	8.1	277	July 13	12.3	6,978
Jan. 21	8.7	597	July 16	11.9	6,205
Jan. 26	7.8	174	July 19	11.4	5,127
Jan. 28	7.7	162	July 21	12.3	6,777
Feb. 1	7.4	141	July 24	13.65	9,366
Feb. 4	7.2	117	July 27	13.6	9,594
Feb. 8	8.3	460	July 30	11.7	5,367
Feb. 11	7.9	161	Aug. 4	10.2	2,944
Feb. 14	7.9	170	Aug. 7	9.2	1,676
Feb. 17	7.3	130	Aug. 10	8.4	744
Feb. 20	8.3	274	Aug. 13	7.7	325
Feb. 23	8.55	325	Aug. 16	7.2	120
Feb. 27	8.1	272	Aug. 20	6.7	12
Mar. 3	7.8	190	Aug. 23	6.5	8
Mar. 6	8.3	491	Aug. 26	6.5	6
Mar. 9	7.75	165	Aug. 29	6.5	10
Mar. 13	9.7	1,719	Aug. 31	7.0	77
Mar. 16	10.2	1,996	Sept. 4	6.3	6
Mar. 20	8.5	601	Sept. 11	7.0	67
Mar. 24	9.1	1,031	Sept. 15	7.4	173
Mar. 27	8.6	693	Sept. 20	7.15	134
Mar. 30	8.5	622	Sept. 23	8.6	914
Apr. 3	8.0	193	Sept. 27	7.6	214
Apr. 9	9.2	1,125	Sept. 30	7.5	119
Apr. 16	8.3	289	Oct. 4	9.0	1,342
Apr. 19	7.6	116	Oct. 8	11.95	5,578
Apr. 22	7.5	102	Oct. 10	13.8	9,706
Apr. 26	7.9	167	Oct. 14	13.7	9,121
Apr. 30	10.0	1,746	Oct. 17	12.2	6,542
May 3	11.1	3,290	Oct. 21	10.6	3,493
May 6	10.4	2,464	Oct. 24	10.4	2,924
May 10	10.9	3,118	Oct. 27	10.0	2,413
May 14	12.8	6,295	Oct. 30	10.2	3,026
May 16	13.05	7,443	Nov. 3	10.4	2,874
May 20	12.0	5,665	Nov. 6	10.05	2,550
May 23	11.0	4,267	Nov. 9	10.1	2,566
May 27	10.15	3,001	Nov. 12	9.6	1,867
May 31	10.0	2,464	Nov. 15	9.65	1,752
June 3	10.4	2,914	Nov. 19	9.55	1,677
June 6	10.2	2,936	Nov. 22	9.4	1,506
June 9	10.9	3,815	Nov. 25	9.5	1,566
June 12	11.1	4,014	Nov. 30	9.4	1,355
June 15	11.5	4,631	Dec. 3	9.2	1,306
June 17	11.8	5,112	Dec. 6	8.8	722
June 20	11.5	5,101	Dec. 10	9.4	1,294
June 23	11.35	4,811	Dec. 13	9.45	1,306
June 26	11.0	4,233	Dec. 17	9.3	1,120
June 29	10.8	3,763	Dec. 20	9.15	841
July 2	10.5	3,120	Dec. 23	9.05	698
July 5	11.9	5,180	Dec. 26	9.15	829
July 6	13.9	9,715	Dec. 30	8.95	710
July 8	11.9	6,342			

Daily gage height, in feet, of Rio Grande near El Paso, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	7.45	7.7	8.1	10.35	10.25	10.55	11.15	6.85	7.9	10.65	9.45
2	6.4	7.2	7.8	8.0	10.65	10.25	10.6	11.05	6.75	8.05	10.4	9.4
3	6.7	7.05	7.8	8.0	11.05	10.3	10.9	10.65	6.6	8.75	10.3	9.25
4	6.7	7.15	7.7	7.95	11.1	10.6	10.7	10.1	6.35	9.15	10.2	9.2
5	6.55	7.2	8.25	7.9	10.85	10.8	12.2	9.7	6.3	9.4	10.2	9.05
6	6.35	7.65	8.3	8.3	10.55	10.2	13.75	9.5	6.3	10.1	10.05	8.8
7	6.35	8.05	8.0	8.8	10.3	10.3	13.6	9.3	6.3	10.8	10.0	8.8
8	......	8.3	7.6	9.05	10.25	10.55	11.85	8.95	6.3	11.65	10.0	9.25
9	......	8.1	7.75	9.2	10.45	11.0	11.7	8.75	6.3	13.35	10.05	9.3
10	......	8.05	7.5	9.3	10.8	10.8	12.8	8.35	6.65	13.75	9.85	9.35
11	6.35	7.9	7.3	9.05	11.25	11.1	13.7	8.1	6.95	13.8	9.75	9.45
12	6.7	7.7	10.45	8.85	11.8	11.1	13.8	7.95	7.25	14.5	9.6	9.45
13	6.7	7.85	9.7	8.8	12.15	11.1	12.35	7.75	7.3	14.5	9.6	9.45
14	6.4	7.9	9.25	8.55	12.85	11.25	11.8	7.55	7.3	13.75	9.6	9.45
15	......	7.5	9.2	8.4	12.95	11.5	11.8	7.35	7.3	13.4	9.65	9.4
16	......	7.35	10.05	8.3	13.05	11.65	11.75	7.25	7.3	12.9	9.8	9.4
17	7.95	7.3	9.55	8.15	12.8	11.8	12.6	7.05	7.05	12.45	9.65	9.3
18	8.15	7.25	8.85	7.85	12.25	11.85	13.2	6.95	7.2	11.55	9.5	9.35
19	8.2	7.6	8.4	7.6	12.05	11.7	11.3	6.85	7.1	11.05	9.5	9.15
20	8.65	8.2	8.5	7.55	11.9	11.5	11.55	6.75	7.45	11.35	9.4	9.15
21	8.7	8.1	8.4	7.9	11.6	10.75	13.0	6.65	8.1	10.6	9.4	9.15
22	8.2	8.1	8.4	7.55	11.4	10.45	12.35	6.5	8.4	10.55	9.4	9.2
23	8.2	8.5	8.4	7.35	11.1	10.85	13.4	6.5	8.15	10.3	9.55	9.05
24	8.3	8.55	9.05	7.35	11.05	10.6	13.8	6.5	8.15	10.35	9.5	9.05
25	8.15	8.35	8.75	7.6	10.7	10.6	14.0	6.5	7.95	10.25	9.5	9.1
26	7.9	8.4	8.7	7.7	10.35	10.85	13.4	6.5	7.95	10.15	9.5	9.15
27	7.8	8.15	8.6	8.0	10.05	10.5	13.7	6.5	7.65	10.0	9.55	9.05
28	7.7	7.75	8.55	9.95	10.0	10.55	13.8	6.4	7.35	10.0	9.5	9.25
29	7.65	......	8.5	10.0	10.0	10.75	12.55	6.45	7.3	10.0	9.5	9.1
30	7.8	......	8.5	9.9	9.9	10.55	11.85	7.4	7.45	10.2	9.45	8.95
31	7.8	......	8.4	......	10.1	......	11.4	7.05	......	10.8	......	8.7

NOTE.—No flow on days for which no gage heights are given.

Daily discharge, in second-feet, of Rio Grande near El Paso, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	[a] 155	140	315	2,240	2,740	3,350	4,390	60	360	3,550	1,370
2	5	115	190	220	2,660	2,740	[a]3,270	4,240	50	450	3,030	1,350
3	20	100	[a] 190	[a] 195	[a]3,220	[a]2,810	3,710	3,630	35	1,110	[a]2,720	[a]1,320
4	20	[a] 110	130	170	3,290	3,200	3,410	[a]2,840	[a] 10	[a]1,480	2,690	1,240
5	10	115	460	145	2,990	3,460	[a]5,860	2,360	5	1,910	2,690	1,030
6	[a] 5	255	[a] 490	445	[a]2,640	[a]2,940	[a]9,380	2,070	5	2,920	[a]2,550	[a] 720
7	5	380	315	820	2,360	3,060	9,210	[a]1,780	5	3,920	2,530	720
8	0	[a] 460	80	1,010	2,310	3,380	[a]6,270	1,380	5	[a]5,140	2,530	1,150
9	0	310	[a] 165	[a]1,120	2,560	[a]3,910	6,040	1,140	5	8,700	[a]2,550	1,200
10	0	275	115	1,210	[a]2,990	3,710	7,730	[a] 720	35	[a]9,590	2,220	[a]1,240
11	5	[a] 160	75	985	3,700	4,010	[a]9,300	570	[a] 65	9,710	2,080	1,310
12	20	125	2,220	805	4,620	[a]4,010	9,550	475	130	11,810	[a]1,870	1,310
13	20	155	[a]1,720	750	5,200	4,010	[a]7,060	[a] 350	145	11,810	1,800	[a]1,310
14	10	[a] 170	1,470	530	[a]6,440	4,240	6,010	265	145	[a]9,290	1,740	1,300
15	0	140	1,440	390	6,940	[a]4,630	6,010	180	[a] 145	8,610	[a]1,750	1,240
16	0	130	[a]1,910	[a] 290	[a]7,440	4,870	[a]5,920	[a] 140	155	7,740	1,860	1,230
17	[a] 220	[a] 130	1,480	250	7,020	[a]5,110	7,740	85	115	[a]6,970	1,750	[a]1,120
18	305	125	925	175	6,090	5,190	9,060	65	140	5,300	1,640	1,130
19	330	175	555	[a] 115	5,750	5,150	[a]4,940	45	125	4,350	[a]1,640	865
20	570	[a] 260	[a] 600	110	5,520	[a]5,100	5,400	[a] 20	[a] 295	4,920	1,550	[a] 840
21	[a] 595	235	530	160	5,110	3,980	[a]8,060	10	645	[a]3,490	1,530	825
22	360	235	530	[a] 110	4,830	3,530	6,870	10	810	3,330	[a]1,510	865
23	360	[a] 315	530	80	[a]4,410	[a]4,100	8,890	[a] 10	[a] 675	2,880	1,600	[a] 700
24	410	325	[a] 995	80	4,340	3,680	[a]9,660	5	600	[a]2,850	1,570	710
25	340	300	795	120	3,820	3,680	10,240	5	460	2,730	[a]1,570	770
26	[a] 220	305	760	[a] 135	3,300	[a]4,020	9,270	[a] 5	460	2,600	1,540	[a] 830
27	175	280	[a] 690	265	[a]2,850	3,480	[a]9,790	5	[a] 250	[a]2,410	1,540	770
28	[a] 160	155	660	1,660	2,700	3,530	9,850	5	95	2,520	1,480	890
29	155	......	620	1,720	2,620	[a]3,710	7,210	[a] 10	70	2,620	1,450	800
30	175	......	[a] 620	[a]1,680	2,390	3,510	[a]5,670	125	[a] 105	[a]3,030	[a]1,390	[a] 710
31	175	......	550	......	[a]2,610	......	4,770	[a] 80	......	3,930	......	560

[a] Date of measurement.

Monthly discharge of Rio Grande near El Paso, Tex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	595	0	151	9,263
February	460	100	214	11,891
March	2,220	75	708	43,537
April	1,720	80	535	31,855
May	7,440	2,240	4,031	247,855
June	5,190	2,740	3,850	229,071
July	10,240	3,270	7,081	435,372
August	4,390	5	871	53,583
September	810	5	195	11,593
October	11,810	360	4,790	294,506
November	3,550	1,390	1,997	118,850
December	1,370	560	1,014	62,370
The year	11,810	0	2,140	1,549,746

RIO GRANDE ABOVE PRESIDIO, TEX.

Location.—At the Haciendita, 9 miles above Presidio. From April, 1900, to September, 1905, the station was located at a point 9 miles above Presidio, 8 miles above the mouth of Rio Conchos, and about 200 miles below El Paso. Owing to the formation of a cut-off around the station it was necessary to abandon this site and, in September, 1905, the station was moved to a point 8 miles farther upstream. The cut-off formed in 1905 having since been closed and caving banks necessitating the abandonment of the new station, it was moved back to its original site on July 6, 1909, with a different gage datum from that of the first station.

Records available.—April 4, 1900, to December 31, 1911.

Gage.—An inclined rod fastened to posts sunk in the ground. Datum changed in September, 1905, and on July 6, 1909.

Channel.—The bed is sandy and shifting. Both banks are fairly permanent and are inundated by extreme floods.

Discharge measurements.—Made from a cable.

Cooperation.—Station established and operated by the United States section of the International Boundary Commission.

Discharge measurements of Rio Grande above Presidio, Tex., in 1911.

[By W. T. Millington.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Feb. 18	6.1	238	May 21	10.6	2,871
Feb. 19	6.2	302	May 24	10.9	4,537
Feb. 22	4.55	30	May 27	10.9	4,847
Mar. 22	6.85	208	May 30	10.7	3,420
Mar. 25	5.55	62	June 2	8.8	1,043
Mar. 27	5.45	24	June 5	9.3	1,517
Mar. 30	5.0	12	June 8	9.7	2,520
Apr. 2	6.1	64	June 11	9.5	2,363
Apr. 5	5.7	41	June 14	11.85	4,975
Apr. 8	5.1	7	June 17	10.2	3,198
Apr. 19	5.2	14	June 20	9.7	1,956
Apr. 22	4.9	4	June 23	10.4	2,616
Apr. 25	6.9	160	June 26	10.8	2,958
Apr. 29	5.2	10	June 29	9.8	1,716
May 6	7.0	291	July 3	11.1	4,772
May 9	8.9	1,353	July 6	9.55	1,414
May 12	8.1	563	July 9	10.7	3,687
May 15	9.3	1,293	July 12	11.5	5,440
May 18	10.4	2,596	July 15	10.9	4,162

Discharge measurements of Rio Grande above Presidio, Tex., in 1911—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
July 18	11.1	4,021	Oct. 12	9.85	1,940
July 21	12.9	6,457	Oct. 15	10.6	3,820
July 24	12.65	6,786	Oct. 18	11.0	4,396
July 27	12.05	5,953	Oct. 21	11.3	5,046
July 30	11.8	5,316	Oct. 24	10.95	3,505
Aug. 3	12.15	6,495	Oct. 27	9.0	1,790
Aug. 6	9.65	2,371	Oct. 30	8.9	1,752
Aug. 9	8.3	1,059	Nov. 2	9.05	2,125
Aug. 12	7.3	622	Nov. 5	8.9	1,693
Aug. 15	6.8	284	Nov. 8	8.5	1,241
Aug. 18	6.2	175	Nov. 11	8.8	1,590
Aug. 21	5.7	105	Nov. 14	8.5	1,270
Aug. 24	5.8	145	Nov. 17	8.3	1,109
Aug. 27	6.2	229	Nov. 20	8.3	1,126
Aug. 30	6.1	193	Nov. 23	8.2	1,213
Sept. 2	5.7	129	Nov. 26	8.1	861
Sept. 5	5.5	97	Nov. 29	8.2	873
Sept. 8	7.9	880	Dec. 3	8.2	1,093
Sept. 11	5.45	100	Dec. 6	7.9	926
Sept. 14	5.8	197	Dec. 9	7.7	843
Sept. 17	5.3	101	Dec. 12	7.6	705
Sept. 20	5.1	71	Dec. 15	7.8	711
Sept. 23	5.7	157	Dec. 18	7.9	794
Sept. 26	5.2	88	Dec. 21	8.0	951
Sept. 29	5.0	47	Dec. 24	7.9	1,072
Oct. 3	5.6	102	Dec. 27	7.6	872
Oct. 6	5.3	72	Dec. 30	7.6	939
Oct. 9	5.1	42			

Daily gage height, in feet, of Rio Grande above Presidio, Tex., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			4.9	4.85	8.95	9.4	12.4	5.8	4.9	8.95	8.0
2			6.05		8.75	10.5	12.35	5.7	5.65	9.0	8.05
3			6.05		8.85	11.1	12.35	5.6	5.55	9.6	8.2
4			5.85		9.25	9.5	12.25	5.6	5.35	9.6	8.0
5			5.65		9.3	9.55	10.6	5.5	5.3	8.85	8.0
6			5.45	7.0	9.25	9.65	9.6	5.6	5.25	8.8	7.9
7			5.35	8.0	9.25	9.8	9.1	5.25	5.1	8.65	7.85
8			5.05	8.7	9.8	9.8	8.55	7.2	5.1	8.55	7.75
9			4.8	8.9	9.8	11.0	8.2	6.0	5.05	8.85	7.85
10				8.6	9.6	12.15	7.85	5.55	7.4	8.9	7.45
11				8.4	9.4	11.65	7.55	5.75	8.95	8.85	7.5
12				8.15	10.85	11.45	7.3	6.3	9.75	8.65	7.6
13				8.35	12.6	11.0	7.1	5.9	10.0	8.65	7.7
14				9.3	11.2	10.9	6.85	5.75	10.5	8.5	7.8
15				9.35	10.3	11.35	6.7	5.4	10.55	8.3	7.3
16				9.35	10.2	11.75	6.45	5.35	10.5	8.2	7.95
17				11.35	10.2	11.2	6.35	5.25	10.75	8.3	7.9
18	5.3			10.35	10.25	11.65	6.15	5.2	11.0	8.3	7.9
19	5.2		5.1	10.5	10.25	12.5	5.95	5.1	11.0	8.35	7.9
20	5.4		5.05	10.55	10.05	12.5	5.75	5.7	11.05	8.3	7.9
21	4.95		5.0	10.65	11.35	12.95	5.65	6.35	11.4	8.2	8.0
22	4.6	6.8	4.9	10.75	10.6	13.05	5.6	6.0	11.75	8.15	7.7
23		6.35	4.9	10.85	10.5	12.55	5.65	5.7	11.7	8.15	7.85
24		5.75		10.9	10.65	12.5	5.75	5.5	10.95	8.1	7.75
25		5.5	7.15	10.9	10.8	12.0	8.35	5.35	9.65	8.1	7.65
26		5.65	6.5	10.9	10.75	11.65	6.55	5.2	9.45	8.1	7.8
27		5.6	6.1	10.85	10.2	11.95	6.3	5.15	9.05	8.4	7.65
28		5.55	5.6	11.6	10.0	12.3	7.0	5.1	9.25	8.2	7.6
29		5.2	5.2	10.85	9.7	12.05	7.05	5.0	9.1	8.2	7.5
30		4.95	4.9	10.7	9.45	11.8	6.1	4.9	8.85	8.1	7.6
31		4.9		10.6		12.05	6.0		8.65		7.6

NOTE.—No flow during January and on days for which no gage heights are given.

Daily discharge, in second-feet, of Rio Grande above Presidio, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	10	5	1,220	1,400	6,700	145	30	1,990	760
2	0	0	0	[a]60	0	[a]1,000	3,580	6,660	[a]130	105	[a]2,060	875
3	0	0	0	60	0	1,090	[a]4,770	[a]6,830	115	[a]95	2,780	[a]1,090
4	0	0	0	50	0	1,470	1,490	6,660	115	75	2,780	980
5	0	0	0	[a]40	0	[a]1,520	1,500	3,940	[a]95	70	[a]1,640	960
6	0	0	0	30	[a]290	1,470	[a]1,610	[a]2,320	105	[a]65	1,580	[a]925
7	0	0	0	25	850	1,470	1,910	1,840	70	40	1,410	905
8	0	0	0	5	1,240	[a]2,720	1,910	1,300	[a]655	40	[a]1,300	865
9	0	0	0	5	[a]1,350	2,720	[a]4,290	[a]1,010	270	[a]35	1,650	[a]995
10	0	0	0	0	1,060	2,480	6,640	860	135	975	1,710	580
11	0	0	0	0	860	[a]2,240	5,690	730	[a]185	1,590	[a]1,640	615
12	0	0	0	0	[a]595	4,360	[a]5,230	[a]620	340	[a]1,900	1,420	[a]705
13	0	0	0	0	715	6,950	4,370	485	225	2,370	1,420	710
14	0	0	0	0	1,295	[a]4,270	4,160	315	[a]190	3,490	[a]1,270	710
15	0	0	0	0	[a]1,350	3,310	[a]4,880	[a]265	120	[a]3,750	1,110	710
16	0	0	0	0	1,350	3,200	5,520	220	110	3,680	1,030	795
17	0	0	0	0	4,500	[a]3,200	4,250	205	[a]95	4,040	[a]1,110	785
18	0	[a]130	0	0	[a]2,530	3,250	[a]4,760	[a]170	85	[a]4,400	1,120	[a]795
19	0	[a]120	0	[a]10	2,730	3,250	5,910	140	70	4,400	1,160	825
20	0	140	0	10	2,800	[a]2,780	5,910	110	[a]155	4,500	[a]1,130	860
21	0	70	0	10	[a]3,020	3,510	6,560	[a]100	245	[a]5,250	1,100	[a]950
22	0	[a]35	[a]205	[a]5	3,580	2,800	7,030	90	195	5,950	1,120	830
23	0	0	155	5	4,130	[a]2,710	6,310	105	[a]155	5,790	[a]1,180	980
24	0	0	85	0	[a]4,540	2,830	[a]6,580	[a]130	130	[a]3,510	1,050	[a]970
25	0	0	[a]55	[a]180	4,640	2,960	5,880	1,090	110	2,360	950	905
26	0	0	60	125	4,740	[a]2,900	5,400	370	[a]90	2,180	[a]860	1,010
27	0	0	[a]40	90	[a]4,700	2,210	[a]5,810	[a]265	80	[a]1,830	1,100	[a]900
28	0	0	30	45	6,670	1,970	6,590	515	70	1,990	870	895
29	0	......	20	[a]10	4,140	[a]1,640	5,950	535	[a]45	1,890	[a]870	755
30	0	......	[a]10	5	[a]3,420	1,440	[a]5,320	[a]195	30	[a]1,720	790	[a]940
31	0	......	10	......	3,220	......	5,820	180	......	1,600	......	940

[a] Date of measurement.

Monthly discharge of Rio Grande above Presidio, Tex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	0	0	0	0
February	140	0	18	962
March	205	0	22	1,329
April	180	0	26	1,547
May	6,670	0	2,268	139,478
June	6,950	1,000	2,631	156,575
July	7,030	1,400	4,743	291,630
August	6,830	90	1,450	89,167
September	655	30	152	9,045
October	5,950	30	2,249	138,288
November	2,780	790	1,374	81,759
December	1,090	580	856	52,641
The year	7,030	0	1,330	962,441

RIO GRANDE BELOW PRESIDIO, TEX.

Location.—6 miles below Presidio and 7 miles below the mouth of Rio Conchos, at the west end of the canyon section of the Rio Grande.

Records available.—April 8, 1900, to December 31, 1911.

Gage.—Inclined rod bolted to posts sunk into the ground. An additional flood gage is nailed to a tree at the gravel hills.

Channel.—The bed is of shifting sand and is affected by a drainage line called Alamos Creek, which enters the river one-fourth mile below the station. This creek is subject to torrential floods, which bring large quantities of bowlders and gravel into the Rio Grande, forming a temporary dam which remains, throwing backwater onto the gage until a flood in the river scours it out. The right bank is a rock bluff. The left bank is an alluvial deposit and overflows above a stage of about 13 feet for a distance of 750 feet back from the stream to gravel hills.

Discharge measurements.—From cable for stream proper and from boat for flooded left bank.

Cooperation.—Station established and operated by the United States section of the International Boundary Commission.

Discharge measurements of Rio Grande below Presidio, Tex., in 1911.

[By W. T. Millington.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 4	6.2	48	July 4	10.4	4,693
Jan. 7	6.2	39	July 7	11.4	6,200
Jan. 10	6.2	34	July 10	11.8	8,561
Jan. 13	6.2	33	July 13	14.6	17,046
Jan. 16	6.2	30	July 16	12.0	9,968
Jan. 19	6.2	27	July 19	14.7	16,585
Jan. 22	6.1	26	July 22	13.75	14,306
Jan. 25	6.2	29	July 25	14.7	18,720
Jan. 28	6.3	40	July 28	11.9	10,445
Jan. 31	6.4	50	July 31	13.4	13,582
Feb. 4	6.3	47	Aug. 4	12.9	11,551
Feb. 7	6.4	68	Aug. 7	11.35	7,324
Feb. 10	6.5	95	Aug. 10	10.35	5,362
Feb. 13	6.4	[a]120	Aug. 13	9.8	4,033
Feb. 16	6.6	191	Aug. 16	9.2	3,095
Feb. 18	8.05	823	Aug. 19	8.6	2,193
Feb. 19	7.5	359	Aug. 22	8.3	1,572
Feb. 22	6.9	243	Aug. 25	9.1	2,494
Feb. 25	6.7	173	Aug. 28	9.4	2,803
Feb. 28	6.6	151	Aug. 31	9.1	2,603
Mar. 4	6.5	118	Sept. 3	10.2	4,174
Mar. 7	6.4	89	Sept. 6	12.9	13,283
Mar. 10	6.3	82	Sept. 9	12.45	9,184
Mar. 13	6.2	74	Sept. 12	12.05	8,360
Mar. 16	6.4	92	Sept. 15	11.0	6,494
Mar. 19	6.2	73	Sept. 18	10.0	4,159
Mar. 22	6.2	64	Sept. 21	10.6	5,538
Mar. 25	7.0	239	Sept. 24	9.5	2,933
Mar. 28	6.7	130	Sept. 27	10.3	4,371
Mar. 31	6.4	97	Sept. 30	9.5	2,708
Apr. 3	6.9	197	Oct. 4	9.1	2,042
Apr. 6	6.7	92	Oct. 8	10.35	5,067
Apr. 9	6.2	56	Oct. 10	9.55	3,538
Apr. 12	6.1	29	Oct. 13	12.6	8,038
Apr. 15	5.9	22	Oct. 16	13.05	10,391
Apr. 18	5.9	18	Oct. 19	12.8	8,463
Apr. 21	5.9	17	Oct. 22	12.4	7,793
Apr. 24	6.6	121	Oct. 25	11.5	6,083
Apr. 27	8.7	1,443	Oct. 28	11.0	4,623
Apr. 30	6.7	107	Oct. 31	10.4	4,177
May 4	6.4	95	Nov. 3	10.6	3,641
May 7	8.2	734	Nov. 6	10.6	3,434
May 10	9.1	1,422	Nov. 9	10.5	2,984
May 13	8.8	1,094	Nov. 12	10.1	2,768
May 14	13.8	9,801	Nov. 15	10.7	4,062
May 16	9.1	1,674	Nov. 18	10.3	3,616
May 19	10.9	3,234	Nov. 21	10.0	2,787
May 22	10.9	4,195	Nov. 24	9.7	2,278
May 25	10.8	3,505	Nov. 27	9.6	2,295
May 28	12.9	8,888	Nov. 30	9.4	2,415
May 31	11.05	5,971	Dec. 4	9.4	3,206
June 3	9.4	2,517	Dec. 7	9.3	3,196
June 6	9.4	2,376	Dec. 10	9.2	3,339
June 9	9.7	3,403	Dec. 13	8.9	3,247
June 12	11.1	6,344	Dec. 16	9.3	4,139
June 15	16.6	30,875	Dec. 19	9.5	4,288
June 18	11.6	8,166	Dec. 22	9.6	4,719
June 21	11.8	8,903	Dec. 25	9.2	3,290
June 24	10.8	4,875	Dec. 28	9.0	3,046
June 27	10.6	4,104	Dec. 31	8.8	2,560
June 30	10.5	4,651			

[a] Heavy wind downstream.

Daily gage height, in feet, of Rio Grande below Presidio, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.3	6.35	6.6	6.4	6.6	10.7	10.4	13.55	10.7	9.55	10.5	9.4
2	6.3	6.3	6.6	6.95	6.5	9.6	11.1	12.9	11.15	9.4	10.5	9.3
3	6.25	6.3	6.5	6.9	6.35	9.3	11.4	12.85	10.45	9.2	10.65	9.5
4	6.2	6.3	6.5	6.85	6.35	9.5	10.4	12.9	11.55	9.1	10.8	9.4
5	6.2	6.3	6.5	6.7	6.3	9.4	10.85	12.15	12.8	9.45	10.75	9.3
6	6.2	6.35	6.4	6.6	6.6	9.4	11.05	11.65	13.05	9.95	10.65	9.3
7	6.2	6.4	6.4	6.4	8.3	9.4	11.55	11.25	13.15	9.8	10.85	9.3
8	6.2	6.4	6.4	6.35	8.85	9.45	11.55	10.85	12.9	10.3	10.65	9.2
9	6.2	6.45	6.4	6.2	9.1	9.6	11.6	10.75	12.4	10.0	10.5	9.35
10	6.2	6.5	6.3	6.2	9.05	9.4	12.05	10.2	12.1	9.7	10.4	9.2
11	6.2	6.5	6.3	6.1	8.8	9.65	13.35	10.0	11.75	10.9	10.3	9.05
12	6.2	6.4	6.3	6.1	8.75	11.75	14.0	9.9	12.1	11.35	10.1	9.0
13	6.2	6.4	6.2	6.1	8.85	13.45	14.25	9.75	12.25	12.6	10.35	8.95
14	6.2	6.5	6.3	6.05	12.4	14.7	13.1	9.55	11.6	12.6	10.95	9.1
15	6.2	6.6	6.4	5.95	10.05	16.45	12.3	9.35	10.95	12.65	10.7	9.2
16	6.2	6.6	6.4	5.9	9.05	14.05	12.1	9.15	10.6	13.0	10.55	9.3
17	6.2	7.4	6.3	5.9	13.9	13.2	11.95	8.95	10.2	12.95	10.45	9.2
18	6.2	8.3	6.2	5.9	11.1	11.5	12.6	8.75	9.95	12.8	10.3	9.35
19	6.2	7.5	6.2	5.9	10.8	10.75	14.9	8.55	9.9	12.8	10.2	9.5
20	6.1	7.45	6.2	5.9	10.3	11.05	14.1	8.5	10.2	12.6	10.1	9.5
21	6.1	7.25	6.2	5.9	10.45	11.35	14.0	8.35	10.8	12.55	10.0	9.5
22	6.1	6.9	6.2	5.9	10.85	10.85	13.7	8.3	9.7	12.4	9.9	9.6
23	6.2	6.8	7.25	6.6	10.75	10.9	13.85	8.1	9.5	12.45	9.8	9.45
24	6.2	6.75	7.0	6.6	10.8	10.75	13.15	7.9	9.8	12.2	9.7	9.3
25	6.2	6.7	7.0	7.75	10.75	10.6	14.85	9.15	11.2	11.5	9.7	9.1
26	6.2	6.7	7.15	8.6	10.8	10.6	14.0	8.75	10.6	11.35	9.6	9.0
27	6.2	6.7	7.2	8.7	10.75	10.55	12.6	9.5	10.7	11.15	9.6	9.0
28	6.3	6.7	6.7	7.25	12.45	10.35	11.95	9.7	9.95	10.95	9.5	8.95
29	6.4	....	6.65	6.8	11.7	10.35	13.0	9.5	9.75	10.8	9.5	8.8
30	6.4	....	6.5	6.7	11.0	10.5	13.05	9.25	9.55	10.7	9.4	8.85
31	6.4	....	6.4	....	11.05	....	13.35	9.1	....	10.4	....	8.8

Daily discharge, in second-feet, of Rio Grande below Presidio, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	55	50	150	95	105	5,240	4,510	13,880	5,800	2,790	4,050	2,610
2	55	45	145	205	100	2,940	5,970	11,610	6.700	2,540	3,770	2,710
3	50	45	120	[a]195	95	[a]2,320	6.630	11,430	[a]4,990	2,210	[a]3,720	3,110
4	[a]50	[a]45	[a]120	165	[a]95	2,670	[a]4,690	[a]11,550	8,670	[a]2,040	3,870	[a]3,210
5	45	50	115	115	90	2,420	5,370	9,500	12,850	2,870	3,730	3,200
6	40	60	90	[a]85	110	[a]2,380	5,670	8,140	[a]13,810	4,000	[a]3,510	3,200
7	[a]40	[a]70	[a]90	70	[a]810	2,520	[a]6,500	[a]7,130	13,320	3,830	3,710	[a]3,200
8	35	70	90	65	1,230	2,760	7,020	6,340	11,600	[a]4,970	3,310	3,180
9	35	80	90	[a]55	1,420	[a]3,200	7,640	6,150	[a]9,080	4,400	[a]2,980	3,410
10	[a]35	[a]95	[a]80	50	[a]1,370	2,770	[a]9,320	[a]5,000	8,460	[a]3,760	2,930	[a]3,340
11	35	110	80	35	1,090	3,800	13,260	4,520	7,740	5,520	2,880	3,290
12	35	105	80	[a]30	1,040	[a]9,210	15,240	4,270	[a]8,450	6,180	[a]2,770	3,280
13	[a]35	[a]120	[a]75	30	[a]1,150	16,800	[a]16,090	[a]3,960	8,720	[a]8,040	3,310	[a]3,300
14	30	155	80	30	7,380	22,390	12,970	3,640	7,560	8,300	4,600	3,610
15	30	190	90	[a]25	3,320	[a]30,190	10,790	3,330	[a]6,380	8,730	[a]4,060	3,870
16	[a]30	[a]190	[a]90	20	[a]1,600	19,300	[a]10,210	[a]3,020	5,560	[a]10,220	3,900	4,140
17	30	545	85	20	9,970	15,440	9,850	2,720	4,630	9,090	3,780	4,070
18	30	[a]940	75	[a]20	3,700	[a]7,920	11,440	2,420	[a]4,040	8,810	[a]3,620	4,180
19	[a]25	[a]360	[a]75	20	[a]3,070	6,040	[a]17,060	[a]2,090	3,930	[a]8,400	3,340	[a]4,290
20	20	350	70	15	2,590	6,860	15,140	1,990	4,620	8,130	3,060	4,400
21	20	310	65	[a]15	3,150	[a]7,090	14,900	1,680	[a]6,010	8,040	[a]2,790	4,510
22	[a]25	[a]245	[a]65	15	[a]4,100	5,070	[a]14,190	[a]1,570	3,410	[a]7,790	2,620	[a]4,720
23	30	210	340	120	3,730	5,280	14,550	1,340	2,930	7,890	2,450	4,230
24	30	190	240	[a]120	3,670	[a]4,680	12,870	1,110	[a]3,530	7,410	[a]2,280	3,730
25	[a]30	[a]175	[a]240	845	[a]3,500	4,110	[a]19,280	[a]2,550	6,330	[a]6,080	2,320	[a]3,190
26	30	175	300	1,380	3,500	4,110	16,650	2,130	5,020	5,640	2,260	3,080
27	30	175	320	[a]1,445	3,380	[a]4,000	12,520	2,910	[a]5,200	5,060	[a]2,290	3,060
28	[a]40	[a]175	[a]130	470	[a]8,180	3,850	[a]10,600	[a]3,250	3,640	[a]4,590	2,300	[a]3,000
29	50	....	125	170	6,990	4,100	12,740	3,030	3,220	4,480	2,410	2,750
30	50	....	110	[a]105	5,890	[a]4,650	12,850	2,760	[a]2,810	4,400	[a]2,420	2,710
31	[a]50	....	[a]95	....	[a]5,970	....	[a]13,480	[a]2,600	....	[a]4,180	....	[a]2,560

[a] Date of measurement.

Monthly discharge of Rio Grande below Presidio, Tex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	55	20	36	2,231
February	940	45	190	10,572
March	340	65	126	7,775
April	1,445	15	201	11,960
May	9,970	90	2,980	183,263
June	30,190	2,320	7,120	423,689
July	19,280	4,510	11,290	694,215
August	13,880	1,110	4,762	292,800
September	13,810	2,810	6,634	394,731
October	10,220	2,040	5,840	359,107
November	4,600	2,260	3,168	188,509
December	4,720	2,560	3,456	212,509
The year	30,190	15	3,840	2,781,361

RIO GRANDE NEAR LANGTRY, TEX.

Location.—One-half mile south of Langtry station on the Southern Pacific Railroad and at the east end of the canyon section of the Rio Grande, a short distance above the confluence of the Pecos and the Rio Grande.

Records available.—April, 1900, to December 31, 1911.

Gage.—Vertical rod bolted to the bluff on the right bank.

Channel.—Bed sandy and shifting. The right (Mexican) bank is a rock bluff; the left bank is an alluvial deposit for 200 feet back to a rock bluff, and overflows at about 29.5 feet on the gage.

Discharge measurements.—Made from cable.

Cooperation.—Station was established and operated by the United States section of the International Boundary Commission.

Discharge measurements of Rio Grande near Langtry, Tex., in 1911.

[By E. E. Winter and W. H. Dodd.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 2	− 0.1	478	May 3	0.4	788
Jan. 7	− .05	478	May 8	.0	557
Jan. 12	− .05	485	May 12	.4	779
Jan. 16	− .05	490	May 16	13.8	34,500
Jan. 20	− .1	482	May 18	6.65	16,349
Jan. 24	− .1	465	May 22	2.7	3,750
Jan. 28	− .1	466	May 26	2.9	4,259
Feb. 1	− .1	462	May 31	5.1	9,936
Feb. 6	− .1	458	June 2	2.9	4,259
Feb. 10	− .15	455	June 7	1.9	2,348
Feb. 15	− .15	442	June 12	2.0	2,485
Feb. 19	.8	1,058	June 16	6.8	12,900
Feb. 22	.7	1,001	June 23	4.7	8,983
Feb. 25	.5	840	June 27	3.1	4,292
Mar. 2	.1	608	July 2	3.0	4,020
Mar. 6	.0	557	July 7	2.95	3,715
Mar. 10	− .05	530	July 11	4.1	6,362
Mar. 15	− .1	505	July 15	5.9	12,610
Mar. 20	− .1	510	July 21	5.4	10,720
Mar. 24	− .1	488	July 24	6.6	13,482
Mar. 28	− .1	511	July 28	5.65	11,693
Apr. 2	.3	654	Aug. 2	5.7	11,288
Apr. 6	.0	570	Aug. 7	4.45	7,574
Apr. 10	.0	566	Aug. 11	3.2	4,636
Apr. 14	.0	562	Aug. 15	2.6	3,635
Apr. 19	− .1	457	Aug. 19	1.9	2,261
Apr. 23	− .1	462	Aug. 24	1.2	1,449
Apr. 26	1.9	2,329	Aug. 28	4.15	6,806
Apr. 28	2.8	4,136	Sept. 2	1.7	1,968

Discharge measurements of Rio Grande near Langtry, Tex., in 1911.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Sept. 6	3.1	4,376	Nov. 8	2.9	4,416
Sept. 11	4.35	7,411	Nov. 12	2.85	4,219
Sept. 15	4.0	6,197	Nov. 16	2.9	4,467
Sept. 20	2.4	3,076	Nov. 21	2.5	3,274
Sept. 24	2.85	4,216	Nov. 25	2.2	2,734
Sept. 27	3.05	4,891	Nov. 29	2.0	2,421
Oct. 2	2.0	2,645	Dec. 2	1.95	2,333
Oct. 6	1.7	2,236	Dec. 7	1.95	2,339
Oct. 10	2.85	4,264	Dec. 12	1.95	2,307
Oct. 14	2.95	4,473	Dec. 16	1.6	1,920
Oct. 18	4.35	7,538	Dec. 20	1.6	1,946
Oct. 23	4.3	7,367	Dec. 24	1.6	1,941
Oct. 28	3.4	5,324	Dec. 28	1.6	1,885
Nov. 3	2.8	4,208			

Daily gage height, in feet, of Rio Grande near Langtry, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	−0.05	−0.1	0.25	0.3	0.75	3.1	2.9	5.5	1.6	2.3	2.85	1.95
2	− .1	− .1	.1	.3	.55	2.85	2.95	5.6	1.7	2.05	2.8	1.95
3	− .05	− .1	.1	.3	.35	3.25	2.85	5.5	2.75	2.0	2.8	1.9
4	− .05	− .1	.1	.2	.25	2.85	2.85	5.0	3.0	1.95	2.8	1.9
5	.0	− .1	.1	.05	.15	2.25	2.8	5.05	3.1	1.8	2.8	1.9
6	.0	− .1	.0	.0	.05	1.9	2.75	5.05	3.3	1.7	2.8	1.95
7	− .05	− .15	.0	.05	.0	1.9	2.9	4.45	3.25	1.65	2.85	1.95
8	− .05	− .15	− .05	.1	.0	1.85	3.55	4.05	3.9	1.9	2.9	1.9
9	− .05	− .15	− .1	.05	.0	1.85	4.15	3.75	5.35	3.9	2.9	1.8
10	− .05	− .15	− .05	.0	.0	1.9	5.0	3.5	4.8	2.85	2.9	1.8
11	− .05	− .15	− .05	.0	.0	1.9	4.25	3.1	4.4	2.45	2.9	1.85
12	− .05	− .15	− .1	− .1	.4	2.1	4.55	2.95	3.95	2.2	2.8	1.95
13	− .05	− .15	− .1	− .05	.25	2.15	4.8	2.8	3.6	2.2	2.6	1.85
14	− .05	− .15	− .15	.0	1.6	3.05	6.75	2.75	3.65	3.05	2.75	1.7
15	− .05	− .15	− .1	− .1	7.45	3.9	5.95	2.6	3.8	3.55	2.8	1.6
16	− .05	− .15	− .15	− .05	13.25	6.8	5.2	2.45	3.75	4.35	2.9	1.6
17	− .05	− .15	− .15	− .05	6.95	6.5	4.2	2.2	3.25	4.05	2.9	1.65
18	− .05	.55	− .1	− .1	6.3	5.15	4.8	2.05	2.85	4.3	2.7	1.65
19	− .1	.8	− .05	− .1	4.5	3.95	4.6	1.85	2.6	4.45	2.65	1.65
20	− .1	.65	− .1	− .1	3.5	3.4	4.85	1.65	2.35	4.4	2.5	1.6
21	− .1	.7	− .2	− .1	2.95	3.55	5.5	1.6	2.05	4.35	2.5	1.6
22	− .1	.65	− .2	− .1	2.7	3.55	5.15	1.6	1.95	4.2	2.45	1.6
23	− .1	.55	− .15	− .1	3.05	4.5	6.45	1.45	2.45	4.25	2.3	1.6
24	− .1	.55	− .1	− .1	3.0	3.75	6.45	1.2	2.85	4.1	2.25	1.6
25	− .1	.45	− .1	.0	3.0	3.55	4.95	1.2	2.45	4.2	2.2	1.55
26	− .1	.45	− .1	1.6	2.9	3.3	5.5	1.45	2.1	4.1	2.2	1.55
27	− .1	.35	− .1	1.75	3.55	3.1	5.8	1.6	3.1	3.6	2.15	1.55
28	− .1	.3	− .1	2.8	3.9	3.05	5.6	4.3	2.7	3.35	2.1	1.6
29	− .1	....	− .1	1.7	3.65	2.95	4.8	2.7	2.6	3.2	2.0	1.55
30	− .1	....	.15	1.05	4.8	2.85	4.75	2.3	2.5	3.1	2.0	1.5
31	− .1	....	.3	....	4.8	....	5.8	2.6	....	2.95	....	1.5

Daily discharge, in second-feet, of Rio Grande near Langtry, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	500	[a]460	695	655	1,270	4,790	3,750	10,890	1,790	3,280	4,280	2,330
2	[a]480	460	[a]610	[a]655	1,000	[a]4,130	[a]3,920	[a]11,060	[a]1,990	[a]2,750	4,210	[a]2,330
3	490	460	610	655	[a]760	4,930	3,680	10,660	3,780	2,640	[a]4,210	2,260
4	485	460	610	625	700	4,160	3,640	9,340	4,210	2,580	4,220	2,260
5	495	460	610	585	645	3,020	3,500	9,290	4,380	2,380	4,230	2,260
6	490	[a]460	[a]555	[a]570	585	2,350	3,360	9,120	[a]4,860	[a]2,240	4,240	2,340
7	[a]480	455	555	585	555	[a]2,350	[a]3,610	[a]7,570	4,740	2,150	4,330	[a]2,340
8	480	455	530	600	[a]555	2,280	5,100	6,660	6,320	2,590	[a]4,420	2,270
9	480	455	505	580	555	2,280	6,480	5,950	9,840	6,110	4,380	2,150
10	480	[a]455	[a]530	[a]565	555	2,350	8,430	5,340	8,510	[a]4,260	4,350	2,140

[a] Date of measurement.

Daily discharge, in second-feet, of Rio Grande near Langtry, Tex., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	485	455	530	565	550	2,350	a 6,880	a 4,470	a 7,530	3,430	4,320	2,190
12	a 485	450	505	530	a 780	a 2,700	7,920	4,220	6,370	2,910	a 4,140	a 2,310
13	485	450	505	545	690	2,810	8,790	3,970	5,460	2,910	3,890	2,200
14	485	445	480	a 560	2,310	4,760	15,560	3,890	5,550	a 4,690	4,160	2,030
15	490	a 440	a 505	515	16,720	6,610	12,780	a 3,630	a 5,830	5,790	4,270	1,920
16	a 490	440	485	515	a 33,100	a 12,900	10,510	3,330	5,710	7,540	a 4,470	1,920
17	490	440	485	500	17,100	12,340	7,510	2,870	4,730	6,880	4,390	1,960
18	490	875	510	470	a 15,230	9,810	9,110	2,570	3,940	a 7,430	3,910	1,990
19	480	a 1,060	530	a 455	9,490	7,570	8,580	a 2,200	3,470	7,780	3,730	1,990
20	a 480	975	a 510	460	6,300	6,540	9,240	1,970	a 2,980	7,640	3,350	a 1,950
21	480	1,000	465	460	4,540	6,820	a 10,950	1,910	2,380	7,510	a 3,270	1,950
22	475	a 960	460	460	a 3,750	6,820	10,140	1,910	2,180	7,130	3,180	1,940
23	470	880	475	a 460	4,640	a 8,400	13,130	1,740	3,310	a 7,250	2,910	1,940
24	a 465	880	a 490	460	4,510	6,200	a 13,200	a 1,450	a 4,220	6,910	2,820	a 1,940
25	465	a 810	495	490	4,510	5,610	10,380	1,450	3,420	7,140	a 2,730	1,870
26	465	810	500	a 1,970	a 4,260	4,880	11,410	1,750	2,720	6,910	2,730	1,860
27	465	755	505	2,150	5,940	a 4,290	11,980	1,930	a 5,000	5,780	2,660	1,840
28	a 465	725	a 510	a 4,140	6,840	4,160	a 11,590	a 7,100	4,140	a 5,220	2,580	a 1,990
29	465	....	510	2,600	6,190	3,880	9,990	3,950	3,930	4,920	a 2,420	1,830
30	465	....	600	1,690	9,160	3,610	9,890	3,160	3,710	4,720	2,420	1,780
31	465	....	655	....	a 9,160	....	11,990	3,750	....	4,420	....	1,780

a Date of measurement.

Monthly discharge of Rio Grande near Langtry, Tex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	500	465	480	29,484
February	1,060	440	622	34,572
March	695	460	533	32,767
April	4,140	455	869	51,709
May	33,100	550	5,579	343,041
June	12,900	2,280	5,190	308,826
July	15,560	3,360	8,613	529,587
August	11,060	1,450	4,810	295,735
September	9,840	1,790	4,567	271,735
October	7,780	2,150	5,028	309,183
November	4,470	2,420	3,707	220,602
December	2,340	1,780	2,057	126,506
The year	33,100	440	3,527	2,553,747

RIO GRANDE BELOW DEVILS RIVER, TEX.

Location.—About 1 mile below the mouth of Devils River and the station of Devils River and about 480 miles below El Paso, Tex.

Records available.—April, 1900, to December 31, 1911.

Gage.—Inclined rod spiked to posts set in the ground.

Channel.—Bed is composed of gravel and sand and is shifting; right bank is an alluvial deposit which is inundated by extreme floods for a distance of about 500 feet back from the river proper; left bank is a loose rock embankment of the Southern Pacific Railroad.

Discharge measurements.—Made from cable.

Cooperation.—Station established and operated by the United States section of the International Boundary Commission.

Discharge measurements of Rio Grande below Devils River, Tex., in 1911.

[By E. E. Winter and W. H. Dodd.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 6	3.5	1,221	July 10	5.15	5,040
Jan. 11	3.5	1,237	July 14	6.5	10,054
Jan. 15	3.5	1,289	July 19	6.2	9,392
Jan. 19	3.5	1,258	July 23	6.9	11,917
Jan. 23	3.5	1,233	July 27	6.3	9,447
Jan. 27	3.5	1,223	July 31	6.5	11,204
Jan. 31	3.5	1,217	Aug. 5	6.95	11,591
Feb. 4	3.5	1,160	Aug. 10	5.6	7,134
Feb. 9	3.45	1,140	Aug. 14	5.1	4,795
Feb. 14	3.45	1,139	Aug. 18	4.7	4,123
Feb. 18	4.05	2,542	Aug. 23	4.25	2,566
Feb. 20	5.45	6,486	Aug. 26	4.0	2,161
Feb. 24	4.0	2,415	Aug. 31	5.2	5,116
Feb. 28	3.9	2,061	Sept. 5	5.75	7,452
Mar. 5	3.7	1,571	Sept. 8	5.9	7,172
Mar. 9	3.6	1,365	Sept. 13	5.5	6,357
Mar. 14	3.55	1,271	Sept. 19	4.9	4,538
Mar. 18	3.5	1,196	Sept. 23	4.6	3,657
Mar. 23	3.6	1,351	Sept. 26	4.6	3,628
Mar. 27	3.6	1,371	Sept. 30	4.8	4,260
Mar. 31	3.7	1,544	Oct. 5	4.4	3,090
Apr. 5	5.55	7,188	Oct. 9	5.15	6,878
Apr. 8	3.9	2,081	Oct. 13	4.6	3,669
Apr. 13	3.7	1,543	Oct. 17	5.8	7,901
Apr. 17	3.8	1,889	Oct. 21	6.0	8,264
Apr. 22	3.65	1,453	Oct. 26	5.75	7,577
Apr. 27	4.35	2,924	Oct. 31	5.1	5,258
Apr. 30	4.35	2,978	Nov. 6	5.05	5,121
May 6	3.9	2,120	Nov. 11	5.0	5,032
May 11	3.6	1,439	Nov. 15	4.75	4,311
May 17	9.5	28,363	Nov. 20	4.8	4,318
May 21	5.5	6,874	Nov. 24	4.65	3,701
May 25	5.1	5,004	Nov. 28	4.5	3,404
May 29	5.25	5,805	Nov. 30	4.5	3,194
June 6	4.5	3,659	Dec. 6	4.45	3,022
June 10	4.3	3,126	Dec. 11	4.4	2,995
June 15	4.5	3,709	Dec. 15	4.35	2,829
June 17	7.25	13,359	Dec. 19	4.3	2,710
June 26	5.35	5,552	Dec. 23	4.3	2,674
June 30	5.0	4,743	Dec. 27	4.3	2,679
July 3	5.0	4,856	Dec. 31	4.25	2,534

Daily gage height, in feet, of Rio Grande below Devils River, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	3.5	3.7	3.7	4.6	5.25	4.9	6.6	5.0	4.65	5.0	4.5
2	3.5	3.5	3.7	3.7	4.55	4.95	4.9	6.35	4.7	4.5	5.0	4.5
3	3.5	3.5	3.65	5.2	4.15	5.3	4.9	7.0	4.4	4.5	5.0	4.5
4	3.5	3.5	3.65	6.8	4.0	4.9	4.65	7.1	5.0	4.5	4.9	4.45
5	3.5	3.5	3.7	6.2	4.0	4.75	4.75	7.0	5.45	4.35	5.0	4.45
6	3.5	3.45	3.7	4.75	3.9	4.5	4.8	7.05	5.3	4.3	5.0	4.45
7	3.5	3.45	3.7	4.05	3.85	4.4	4.9	6.6	5.0	4.2	5.15	4.45
8	3.5	3.45	3.6	3.9	3.75	4.35	5.0	6.1	5.55	4.2	5.1	4.4
9	3.5	3.45	3.6	3.9	3.65	4.3	5.1	5.9	6.35	5.15	5.1	4.4
10	3.5	3.5	3.6	3.8	3.65	4.3	5.2	5.55	6.2	5.15	5.15	4.4
11	3.5	3.5	3.55	3.75	3.6	4.3	6.35	5.3	5.4	4.9	5.0	4.4
12	3.5	3.45	3.55	3.7	3.65	4.3	5.45	5.2	5.1	4.75	4.9	4.45
13	3.5	3.45	3.55	3.7	3.9	4.3	5.75	5.1	5.35	4.6	4.9	4.55
14	3.5	3.45	3.55	3.7	4.75	4.3	6.6	5.1	5.5	4.8	4.8	4.4
15	3.5	3.5	3.5	3.7	5.9	4.9	6.95	5.0	5.55	5.1	4.75	4.35
16	3.5	3.5	3.55	4.0	8.05	6.75	6.55	5.0	5.6	5.2	4.75	4.3
17	3.5	3.55	3.5	3.75	8.2	7.2	6.1	4.9	5.2	5.8	4.75	4.25
18	3.5	4.1	3.5	3.7	5.6	6.25	6.1	4.7	5.0	5.8	5.0	4.3
19	3.5	4.6	3.75	3.65	6.3	5.8	6.1	4.6	4.9	6.0	4.9	4.3
20	3.5	5.5	3.6	3.65	5.9	5.7	6.05	4.5	4.75	5.85	4.8	4.3
21	3.5	4.5	3.5	3.65	5.4	5.6	6.45	4.4	4.7	6.0	4.8	4.3
22	3.5	4.1	3.65	3.65	5.05	5.5	7.05	4.3	4.55	5.9	4.75	4.3
23	3.5	4.1	3.6	3.6	5.35	5.7	6.9	4.25	4.7	5.8	4.7	4.3
24	3.5	4.0	3.6	3.6	5.25	5.65	7.1	4.2	5.0	5.8	4.65	4.3
25	3.5	4.0	3.6	3.65	5.1	5.5	7.55	4.1	4.9	5.85	4.6	4.25

Daily gage height, in feet, of Rio Grande below Devils River, Tex., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	3.5	3.95	3.7	3.65	5.0	5.35	6.4	4.0	4.6	5.75	4.6	4.25
27	3.5	3.9	3.6	4.35	5.0	5.2	6.65	4.35	4.45	5.55	4.55	4.3
28	3.5	3.85	3.6	4.4	5.5	5.1	7.25	4.0	5.05	5.4	4.5	4.25
29	3.5	....	3.6	4.65	5.3	5.05	6.15	6.7	4.8	5.3	4.5	4.2
30	3.5	....	3.6	4.35	5.35	5.0	6.15	6.0	4.6	5.35	4.5	4.25
31	3.5	....	3.75	....	5.65	....	6.7	5.2	....	5.1	....	4.2

Daily discharge, in second-feet, of Rio Grande below Devils River, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,270	1,200	1,640	1,540	3,800	6,360	4,580	11,320	4,760	3,850	4,980	3,180
2	1,260	1,190	1,620	1,540	3,680	5,280	4,620	10,200	4,220	3,440	4,980	3,170
3	1,250	1,170	1,510	6,110	2,720	6,540	a 4,660	12,240	3,680	3,410	4,980	3,160
4	1,240	a 1,160	1,490	11,690	2,360	5,100	4,140	12,350	5,350	3,370	4,700	3,050
5	1,230	1,160	a 1,570	a 9,530	2,360	4,560	4,320	a 11,760	a 6,700	a 2,990	4,980	3,030
6	a 1,220	1,140	1,560	4,720	a 2,120	a 3,660	4,400	11,920	6,330	2,890	a 4,980	a 3,020
7	1,220	1,140	1,560	2,540	2,010	3,390	4,590	10,440	5,580	2,690	5,300	3,020
8	1,230	1,140	1,370	a 2,080	1,780	3,260	4,770	8,790	a 6,550	2,690	5,210	3,000
9	1,230	a 1,140	a 1,370	2,060	1,550	3,130	4,950	8,130	8,750	a 6,880	5,210	3,000
10	1,230	1,160	1,360	1,810	1,550	a 3,130	a 5,220	a 6,960	8,330	6,560	5,300	2,990
11	a 1,240	1,160	1,280	1,680	a 1,440	3,130	9,490	6,020	6,090	5,360	a 5,090	a 2,990
12	1,250	1,140	1,280	1,540	1,560	3,130	6,150	5,510	5,250	4,510	4,740	3,080
13	1,260	1,140	1,270	a 1,540	2,150	3,130	7,270	5,000	a 5,950	a 3,670	4,740	3,260
14	1,280	a 1,140	a 1,270	1,560	4,180	3,130	a 10,450	a 4,790	6,360	4,370	4,460	2,950
15	a 1,290	1,160	1,200	1,580	9,250	a 5,110	11,850	4,630	6,510	5,430	a 4,310	a 2,830
16	1,280	1,160	a 1,270	2,410	20,650	11,600	10,540	4,630	6,660	5,790	4,310	2,710
17	1,270	1,190	1,200	a 1,790	a 21,380	a 13,150	9,060	4,460	5,450	7,900	4,310	2,590
18	1,270	a 2,680	a 1,200	1,660	7,420	9,250	9,060	a 4,120	4,840	7,900	4,940	2,710
19	a 1,260	4,090	1,650	1,530	11,180	7,400	a 9,030	3,780	a 4,540	8,260	4,630	a 2,710
20	1,250	a 6,630	1,350	1,510	9,030	6,990	8,850	3,430	4,130	7,990	a 4,320	2,700
21	1,250	3,820	1,150	1,480	a 6,400	6,580	10,300	3,090	3,970	a 8,260	4,260	2,690
22	1,240	2,690	1,450	a 1,450	4,770	6,170	12,460	2,740	3,570	7,990	4,070	2,680
23	a 1,230	2,690	a 1,350	1,350	6,170	6,990	a 11,920	a 2,570	a 3,960	7,710	3,890	a 2,670
24	1,230	a 2,410	1,360	1,350	5,700	6,780	12,740	2,480	4,850	7,710	a 3,700	2,660
25	1,230	2,380	1,360	1,450	a 5,000	6,170	14,600	2,320	4,540	7,850	3,600	2,580
26	1,230	2,240	1,530	1,450	4,700	a 5,550	9,860	a 2,160	a 3,630	a 7,580	3,600	2,580
27	a 1,220	2,100	a 1,370	a 2,920	4,700	5,200	a 10,850	2,860	3,150	6,940	3,500	a 2,680
28	1,220	a 1,960	1,370	3,090	7,050	4,970	13,250	2,160	5,050	6,420	a 3,400	2,570
29	1,220	....	1,370	3,860	6,050	4,860	9,000	10,260	4,260	6,030	3,300	2,460
30	1,220	....	1,370	a 2,960	6,300	a 4,740	9,000	7,860	a 4,260	6,020	a 3,190	2,550
31	1,220	....	a 1,630	....	7,800	....	a 12,000	a 5,120	....	a 5,260	....	a 2,440

a Date of measurement.

Monthly discharge of Rio Grande below Devils River, Tex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	1,290	1,220	1,243	76,443
February	6,630	1,140	1,906	105,878
March	1,650	1,150	1,398	85,944
April	11,690	1,350	2,727	162,288
May	21,380	1,440	5,704	350,697
June	13,150	3,130	5,615	334,096
July	14,600	4,140	8,515	523,597
August	12,350	2,160	6,262	385,031
September	8,750	3,150	5,242	311,940
October	8,260	2,690	5,733	352,502
November	5,300	3,190	4,431	263,643
December	3,260	2,440	2,830	174,010
The year	21,380	1,140	4,320	3,126,069

RIO GRANDE AT EAGLE PASS, TEX.

Location.—Half a mile above the highway bridge at Eagle Pass and about 540 miles below El Paso, Tex.

Records available.—April, 1900, to December 31, 1911.

Gage.—A vertical rod bolted to a shale cliff read to stage 10.5 feet; an inclined rod spiked to posts set in the shale is used for stages above 10.5 feet.

Channel.—The bed is sandy and shifting. At low water the depth is considerable and the current is slow. Right bank is an alluvial deposit and is inundated by floods for a distance of about 1,500 feet back from the stream; left bank is of shale and rises abruptly from the river to a height above flood stages.

Discharge measurements.—Made from cable.

Cooperation.—Station established and operated by the United States section of the International Boundary Commission.

Discharge measurements of Rio Grande at Eagle Pass, Tex., in 1911.

[By J. K. Wilson and Robert Boubel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 3	0.7	1,476	July 3	2.3	4,531
Jan. 6	.7	1,428	July 6	2.3	4,422
Jan. 9	.7	1,416	July 9	3.5	6,655
Jan. 12	.7	1,363	July 12	4.9	11,492
Jan. 15	.7	1,338	July 15	4.2	10,662
Jan. 18	.7	1,609	July 18	4.2	9,953
Jan. 21	.7	1,575	July 21	3.8	8,973
Jan. 24	.7	1,570	July 24	3.8	8,566
Jan. 27	.7	1,532	July 27	6.0	18,191
Jan. 31	.7	1,481	July 31	4.5	11,107
Feb. 3	.7	1,507	Aug. 3	5.1	14,217
Feb. 6	.7	1,494	Aug. 6	5.4	14,975
Feb. 9	.7	1,444	Aug. 9	4.0	9,940
Feb. 12	.7	1,422	Aug. 12	3.7	8,102
Feb. 15	.7	1,423	Aug. 15	3.3	7,276
Feb. 18	.7	1,398	Aug. 18	3.1	6,218
Feb. 21	2.1	3,192	Aug. 21	1.7	3,857
Feb. 24	1.7	2,526	Aug. 24	1.7	3,715
Feb. 28	1.7	2,462	Aug. 27	2.1	4,687
Mar. 3	1.7	2,273	Aug. 31	3.8	8,653
Mar. 6	1.7	2,083	Sept. 3	1.9	3,468
Mar. 9	1.4	1,996	Sept. 6	3.7	6,752
Mar. 12	1.2	1,871	Sept. 9	3.6	6,677
Mar. 15	1.0	1,772	Sept. 12	3.4	6,204
Mar. 18	1.0	1,742	Sept. 15	3.3	5,881
Mar. 21	1.5	2,187	Sept. 18	3.0	6,775
Mar. 24	1.5	2,303	Sept. 21	2.2	4,734
Mar. 27	1.2	2,136	Sept. 24	2.1	4,431
Mar. 31	1.1	1,819	Sept. 27	2.4	5,351
Apr. 3	1.0	1,728	Sept. 30	2.8	6,167
Apr. 5	4.7	5,166	Oct. 3	2.2	4,845
Apr. 8	2.3	2,891	Oct. 6	1.9	4,076
Apr. 11	1.0	1,800	Oct. 9	3.6	8,963
Apr. 14	1.0	1,689	Oct. 12	2.6	6,567
Apr. 17	1.0	1,700	Oct. 13	5.0	13,863
Apr. 20	1.0	1,604	Oct. 15	3.3	7,993
Apr. 23	1.0	1,611	Oct. 18	3.7	8,316
Apr. 28	1.7	2,725	Oct. 21	3.9	10,358
Apr. 30	1.7	2,641	Oct. 24	3.8	9,241
May 3	2.0	2,904	Oct. 27	3.4	8,052
May 6	1.0	1,789	Oct. 31	3.2	7,030
May 9	.8	1,472	Nov. 3	3.0	6,193
May 12	.8	1,417	Nov. 6	2.7	5,153
May 15	.7	1,312	Nov. 9	3.0	5,806
May 16	3.3	6,431	Nov. 12	2.5	4,691
May 18	4.8	9,822	Nov. 15	2.4	4,403
May 21	4.5	7,750	Nov. 18	2.3	5,114
May 24	3.0	5,706	Nov. 21	2.2	4,680
May 27	2.8	5,010	Nov. 24	2.1	4,343
May 31	4.0	6,692	Nov. 27	2.0	4,052
June 3	2.9	5,354	Nov. 30	2.0	3,738
June 6	2.5	4,680	Dec. 3	2.0	4,165
June 9	1.8	3,622	Dec. 6	1.9	3,844
June 12	1.6	3,276	Dec. 9	1.8	3,550
June 15	1.4	2,996	Dec. 12	1.8	3,383
June 16	3.5	7,482	Dec. 15	1.7	3,263
June 17	5.0	11,506	Dec. 18	1.6	3,042
June 20	3.5	7,082	Dec. 21	1.6	2,893
June 23	2.5	4,566	Dec. 24	1.5	2,852
June 26	3.4	6,291	Dec. 27	1.4	2,722
June 30	2.3	4,917	Dec. 31	1.3	2,653

Daily gage height, in feet, of Rio Grande at Eagle Pass, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.7	0.7	1.7	1.0	1.6	3.45	2.3	4.9	2.95	2.6	3.1	1.8
2	.7	.7	1.7	1.0	1.6	3.3	2.3	5.25	2.05	2.3	3.05	1.8
3	.7	.7	1.7	1.0	2.0	2.9	2.3	5.05	1.9	2.2	3.0	2.0
4	.7	.7	1.7	3.25	1.45	2.7	2.3	5.2	2.1	2.2	3.0	1.95
5	.7	.7	1.7	3.85	1.35	2.5	2.3	5.15	2.75	2.05	2.75	1.9
6	.7	.7	1.65	2.85	1.0	2.5	2.3	5.4	3.45	1.9	2.7	1.9
7	.7	.7	1.6	2.55	.8	2.25	2.3	5.25	3.0	1.9	3.2	1.85
8	.7	.7	1.45	2.2	.8	1.9	2.3	4.4	3.05	1.95	3.2	1.8
9	.7	.7	1.35	2.0	.8	1.8	3.5	3.9	3.6	3.5	3.0	1.8
10	.7	.7	1.3	1.85	.8	1.8	3.0	3.8	3.5	2.85	3.0	1.8
11	.7	.7	1.2	1.0	.8	1.7	2.75	3.7	3.5	2.75	3.0	1.8
12	.7	.7	1.1	1.0	.8	1.6	4.9	3.7	3.4	2.6	2.5	1.8
13	.7	.7	1.0	1.0	.8	1.55	4.6	3.5	3.4	4.75	2.5	1.7
14	.7	.7	1.0	1.0	.8	1.4	4.4	3.35	3.35	3.6	2.4	1.7
15	.7	.7	1.0	1.0	.7	1.4	4.2	3.3	3.3	3.3	2.4	1.7
16	.7	.7	1.0	1.0	3.3	3.5	3.45	3.2	3.35	3.3	2.4	1.7
17	.7	.7	1.0	1.0	7.45	5.0	3.3	3.2	3.0	3.45	2.35	1.6
18	.7	.7	1.0	1.0	4.9	4.8	4.2	3.05	2.85	3.65	2.3	1.6
19	.7	.7	1.0	1.0	4.95	3.75	4.05	3.0	2.7	3.75	2.3	1.6
20	.7	2.85	1.5	1.0	4.5	3.5	3.95	2.3	2.6	3.9	2.3	1.6
21	.7	2.05	1.5	1.0	4.5	3.2	3.8	1.7	2.2	3.8	2.2	1.6
22	.7	2.0	1.5	1.0	4.5	2.55	3.8	1.7	2.2	3.6	2.2	1.6
23	.7	1.9	1.5	1.0	2.8	2.5	3.8	1.7	2.2	3.8	2.2	1.5
24	.7	1.7	1.5	1.1	3.0	2.5	3.8	1.7	2.05	3.8	2.1	1.5
25	.7	1.7	1.5	1.1	2.9	2.5	3.8	1.5	2.3	3.7	2.1	1.45
26	.7	1.7	1.2	1.1	2.8	3.2	3.9	1.5	2.35	3.7	2.1	1.4
27	.7	1.7	1.2	1.7	2.8	2.8	5.75	2.1	2.35	3.4	2.0	1.4
28	.7	1.7	1.1	1.7	2.6	2.7	4.9	2.0	2.1	3.2	2.0	1.35
29	.7	....	1.1	1.7	3.25	2.4	4.55	2.05	2.8	3.2	2.0	1.3
30	.7	....	1.1	2.05	3.75	2.3	4.3	2.3	2.75	3.2	2.0	1.3
31	.7	....	1.1	....	3.75	....	4.5	3.65	....	3.2	....	1.3

Daily discharge, in second-feet, of Rio Grande at Eagle Pass, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,540	1,490	2,400	1,730	2,550	6,020	4,790	13,190	6,330	5,730	6,670	3,580
2	1,510	1,500	2,340	1,730	2,550	5,840	4,660	15,010	3,880	5,070	6,430	3,720
3	a 1,480	a 1,510	a 2,270	a 1,730	a 2,900	a 5,350	a 4,530	a 14,090	a 3,470	a 4,250	a 6,190	a 4,160
4	1,460	1,500	2,210	3,820	2,290	5,020	4,490	14,470	3,830	4,790	6,100	4,030
5	1,440	1,500	2,150	a 4,360	2,180	4,680	4,460	14,340	5,020	4,430	5,370	3,900
6	a 1,430	a 1,490	a 2,070	3,410	a 1,790	a 4,680	a 4,420	a 14,980	a 6,500	a 4,080	a 5,150	a 3,840
7	1,420	1,480	2,040	3,120	1,550	4,300	4,420	14,430	5,390	4,080	6,240	3,720
8	1,420	1,460	2,000	a 2,810	1,510	3,770	4,420	11,380	5,540	4,220	6,240	3,600
9	a 1,420	a 1,440	a 1,960	2,640	a 1,470	a 3,620	a 6,650	a 9,590	a 6,680	a 8,720	a 5,810	a 3,550
10	1,400	1,440	1,930	2,510	1,450	3,620	5,650	8,980	6,440	7,160	5,810	3,490
11	1,380	1,430	1,870	a 1,800	1,440	3,450	5,150	8,360	6,440	6,920	5,810	3,440
12	a 1,360	a 1,420	a 1,820	1,760	a 1,420	a 3,280	a 11,490	a 8,100	a 6,200	a 6,570	a 4,690	a 3,380
13	1,360	1,420	1,770	1,730	1,410	3,210	11,130	7,690	6,160	a 13,110	4,660	3,280
14	1,350	1,420	1,770	a 1,690	1,400	3,000	10,900	7,380	6,020	9,280	4,430	3,260
15	a 1,340	a 1,420	a 1,770	1,690	a 1,310	a 3,000	a 10,660	a 7,280	a 5,880	a 7,990	a 4,400	a 3,260
16	1,430	1,420	1,760	1,700	a 6,430	a 7,480	8,410	6,850	6,480	7,990	4,710	3,220
17	1,520	1,410	1,750	a 1,700	23,050	a 11,510	7,960	6,640	6,280	8,110	4,910	3,080
18	a 1,610	a 1,400	a 1,740	1,670	a 10,300	a 10,920	a 9,950	a 6,130	a 6,480	a 8,270	a 5,110	a 3,040
19	1,600	1,400	1,740	1,640	9,880	7,820	9,580	6,050	6,030	8,950	5,040	2,990
20	1,590	4,690	2,190	a 1,600	8,140	a 7,080	9,340	4,870	5,680	9,880	4,960	2,940
21	a 1,580	a 3,110	a 2,190	1,610	a 7,750	6,320	a 8,970	a 3,860	a 4,730	a 10,080	a 4,680	a 2,890
22	1,570	3,020	2,230	1,610	7,750	4,690	8,840	3,840	4,680	9,190	4,630	2,890
23	1,570	2,860	2,260	a 1,610	5,440	a 4,570	8,700	3,830	4,630	9,510	4,590	2,850
24	a 1,570	a 2,530	a 2,300	1,800	a 5,710	4,570	a 8,570	a 3,820	a 4,330	a 9,240	a 4,340	a 2,850
25	1,560	2,510	2,300	1,910	5,410	4,570	8,570	3,430	4,940	8,930	4,310	2,790
26	1,540	2,490	2,140	2,020	5,110	a 6,040	8,870	3,430	5,140	8,870	4,280	2,740
27	a 1,530	2,480	a 2,140	2,610	a 5,010	5,540	a 17,000	a 4,690	a 5,250	a 8,050	a 4,050	a 2,720
28	1,520	a 2,460	2,000	a 2,720	4,730	5,420	13,000	4,450	4,740	7,420	3,950	2,680
29	1,510	....	1,940	2,680	5,640	5,040	11,350	4,570	6,170	7,290	3,840	2,650
30	1,490	....	1,880	2,950	6,340	a 4,920	10,170	5,150	a 6,070	7,160	a 3,740	2,650
31	a 1,480	....	a 1,820	....	a 6,340	....	a 11,110	a 8,300	....	7,030	....	a 2,650

a Date of measurement.

Monthly discharge of Rio Grande at Eagle Pass, Tex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	1,610	1,340	1,483	91,200
February	4,690	1,400	1,918	106,512
March	2,400	1,740	2,024	124,463
April	4,360	1,600	2,212	131,623
May	23,050	1,310	4,847	298,017
June	11,510	3,000	5,311	316,026
July	17,000	4,420	8,329	512,152
August	15,010	3,430	8,038	494,241
September	6,680	3,470	5,514	328,086
October	13,110	4,060	7,515	462,049
November	6,670	3,740	5,038	299,782
December	4,160	2,650	3,220	197,990
The year	23,050	1,310	4,600	3,362,141

RIO GRANDE NEAR LAREDO, TEX.

Location.—Two miles above Laredo and about 670 miles below El Paso.

Records available.—May, 1900, to December 31, 1911, except March 1 to July 31, 1903. Earlier records fragmentary.

Gage.—An inclined rod fastened to posts and trees. Gage was originally located at highway bridge at Laredo, Tex.; maintained April, 1900, to February 28, 1903. Measurements were made at this point only from April to September 24, 1900. Records at this location were poor, hence station was moved 2 miles upstream, where it has been maintained since August 1, 1903.

Channel.—Bed is sandy and shifting; right bank is of alluvial deposit; left bank is a shale bluff; both banks are above flood level.

Discharge measurements.—Made from cable.

Cooperation.—Station established and operated by the Mexican section of the International Boundary Commission.

Discharge measurements of Rio Grande near Laredo, Tex., in 1911.

[By L. Varela.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 6	2.0	1,228	May 7	2.7	2,302
Jan. 11	2.1	1,206	May 12	2.1	1,418
Jan. 16	2.0	1,379	May 13	6.4	11,946
Jan. 21	2.0	1,293	May 18	9.7	24,786
Jan. 26	2.0	1,360	May 20	5.0	8,232
Jan. 31	2.0	1,233	May 26	4.4	5,357
Feb. 4	1.9	1,220	May 30	4.1	5,133
Feb. 12	2.0	1,392	June 2	5.1	7,589
Feb. 16	2.0	1,319	June 8	3.6	3,585
Feb. 19	4.2	5,598	June 13	3.1	2,846
Feb. 25	3.0	2,565	June 17	4.6	6,300
Feb. 28	2.5	1,990	June 19	6.8	13,908
Mar. 5	2.4	1,776	June 23	4.3	5,760
Mar. 10	2.1	1,567	June 29	4.4	5,086
Mar. 16	1.9	1,271	July 5	4.4	5,224
Mar. 21	2.1	1,572	July 12	4.5	5,514
Mar. 22	5.0	7,518	July 15	5.2	8,184
Mar. 31	1.9	1,616	July 17	6.5	12,321
Apr. 5	5.0	7,129	July 22	5.4	7,859
Apr. 6	6.4	12,771	July 26	8.0	19,434
Apr. 11	2.8	2,138	July 29	5.5	10,724
Apr. 15	2.6	1,994	Aug. 3	6.5	12,723
Apr. 20	2.6	1,990	Aug. 8	6.9	13,621
Apr. 29	2.2	1,689	Aug. 13	4.6	5,740
May 1	3.9	4,093	Aug. 18	4.0	4,155

Discharge measurements of Rio Grande near Laredo, Tex., in 1911—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Aug. 23	3.5	2,799	Oct. 27	5.3	9,408
Aug. 29	2.9	3,784	Nov. 1	4.9	7,038
Sept. 2	4.7	5,837	Nov. 7	4.6	6,040
Sept. 8	4.7	5,932	Nov. 13	4.5	5,588
Sept. 12	5.5	9,881	Nov. 18	4.1	4,787
Sept. 19	4.6	5,643	Nov. 24	4.1	4,645
Sept. 25	4.0	3,322	Nov. 29	4.0	4,099
Sept. 30	4.2	4,402	Dec. 5	3.9	3,364
Oct. 5	3.6	3,131	Dec. 9	3.8	3,712
Oct. 11	3.8	4,076	Dec. 16	3.8	3,599
Oct. 14	18.0	43,701	Dec. 22	3.7	3,715
Oct. 15	5.0	9,657	Dec. 26	3.5	3,294
Oct. 21	5.5	9,572	Dec. 29	3.5	3,178

Daily gage height, in feet, of Rio Grande near Laredo, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.1	1.95	2.5	2.0	3.85	4.15	4.2	6.1	5.1	4.1	4.95	4.05
2	2.0	1.9	2.4	2.1	3.5	5.0	4.1	6.5	4.7	4.15	4.95	4.0
3	2.0	1.9	2.4	2.0	3.1	4.4	4.15	6.4	3.55	4.2	4.85	4.15
4	2.0	1.9	2.4	2.5	3.05	4.8	4.25	6.55	3.2	3.95	4.8	4.1
5	2.0	1.9	2.4	4.5	2.7	4.3	4.4	6.8	3.0	3.55	4.65	3.9
6	2.0	1.9	2.4	6.2	2.7	4.2	4.3	6.8	3.15	3.45	4.55	3.9
7	2.0	1.9	2.3	4.35	2.7	3.95	4.3	6.85	3.55	3.65	4.6	3.85
8	2.0	1.9	2.2	3.45	2.45	3.6	4.15	6.75	4.65	3.7	4.5	3.85
9	2.0	1.9	2.1	2.95	2.8	3.15	4.1	6.2	4.55	3.55	4.65	3.8
10	2.1	2.0	2.1	2.8	2.8	3.0	4.1	5.9	4.65	3.5	4.7	3.7
11	2.1	2.0	2.1	2.75	2.1	3.0	4.15	5.6	5.55	3.8	4.75	3.7
12	2.05	2.0	2.1	2.65	2.1	3.1	4.45	5.1	5.45	4.45	4.7	3.6
13	2.0	2.0	2.0	2.6	5.2	3.1	4.6	4.6	5.25	6.8	4.6	3.6
14	2.0	2.0	1.9	2.6	3.45	3.0	4.85	4.45	5.0	14.75	4.5	3.75
15	2.0	2.0	1.9	2.6	3.1	3.05	5.3	4.3	4.9	5.0	4.5	3.8
16	2.0	2.0	1.9	2.6	3.0	3.25	6.55	4.25	4.9	4.85	4.35	3.8
17	2.0	2.0	2.0	2.6	4.0	4.7	6.7	4.15	4.85	5.05	4.25	3.85
18	2.0	2.0	2.05	2.6	9.55	6.7	5.75	4.0	4.7	5.2	4.1	3.8
19	2.0	4.1	2.1	2.6	8.1	6.5	5.5	3.9	4.6	5.35	4.1	3.9
20	2.0	3.4	2.1	2.6	4.7	5.2	5.45	3.9	4.4	5.45	4.25	3.9
21	2.0	3.05	2.1	2.5	4.05	4.9	5.45	3.8	4.4	5.45	4.1	3.7
22	1.9	2.8	4.0	2.3	4.0	4.8	5.45	3.75	4.3	5.4	4.1	3.7
23	1.9	2.65	3.15	2.3	3.7	4.3	6.2	3.5	4.25	5.4	4.0	3.6
24	1.9	2.7	2.7	2.3	3.7	4.4	6.5	3.2	4.05	5.3	4.1	3.65
25	1.9	3.0	2.6	2.3	4.1	4.5	6.9	3.1	4.0	5.25	4.1	3.65
26	2.0	2.85	2.6	2.3	4.4	4.45	7.9	3.0	4.15	5.3	4.0	3.5
27	2.0	2.5	2.55	2.2	4.3	4.4	6.55	2.95	4.2	5.25	4.05	3.55
28	2.0	2.5	2.5	2.2	4.2	4.4	5.6	2.9	4.0	5.15	4.05	3.55
29	2.0	......	2.5	2.2	4.05	4.35	5.5	3.5	3.95	5.15	4.0	3.5
30	2.0	......	2.3	2.2	4.55	4.3	5.4	4.5	4.15	4.85	4.1	3.55
31	2.0	......	1.9	......	4.05	......	5.3	5.4	......	4.9	......	3.5

RIO GRANDE NEAR ROMA, TEX.

Location.—Near Roma and about 775 miles below El Paso, Tex.

Records available.—August 14, 1900, to December 31, 1911, except March and April, 1903.

Gage.—An inclined rod spiked to posts and trees.

Channel.—Bottom sandy and shifting. Right bank, an alluvial deposit covered with mesquite brush and subject to overflow for the width of 250 feet back from the stream; left bank is of hard material and is above flood level.

Discharge measurements.—Made from cable.

Cooperation.—Station established and operated by the Mexican section of the International Boundary Commission.

Discharge measurements of Rio Grande near Roma, Tex., in 1911.

[By H. P. Guerra.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-feet.*		*Feet.*	*Sec.-feet.*
Jan. 2	3.0	1,578	June 30	5.4	4,187
Jan. 6	3.0	1,577	July 4	5.0	3,900
Jan. 10	2.9	1,489	July 8	5.1	3,957
Jan. 14	2.9	1,475	July 12	5.6	4,607
Jan. 18	2.9	1,478	July 17	7.4	12,240
Jan. 22	2.7	1,313	July 21	6.4	9,340
Jan. 26	2.7	1,320	July 25	7.3	12,231
Jan. 30	2.7	1,309	July 29	7.5	12,704
Feb. 2	2.6	1,239	Aug. 2	7.0	11,631
Feb. 6	2.6	1,236	Aug. 7	7.3	12,217
Feb. 10	2.6	1,236	Aug. 11	6.1	8,690
Feb. 14	2.7	1,305	Aug. 15	5.3	4,978
Feb. 18	2.6	1,235	Aug. 19	4.9	3,684
Feb. 20	4.0	3,042	Sept. 1	6.6	9,746
Feb. 23	5.0	5,489	Sept. 5	4.9	3,664
Feb. 28	3.6	2,340	Sept. 9	5.4	5,536
Mar. 2	3.4	2,097	Sept. 13	6.3	9,169
Mar. 6	3.0	1,560	Sept. 18	5.9	8,454
Mar. 10	2.9	1,468	Sept. 24	5.1	4,421
Mar. 14	2.9	1,463	Sept. 26	4.9	4,159
Mar. 18	2.6	1,242	Sept. 30	4.6	3,701
Mar. 22	2.9	1,464	Oct. 4	4.8	4,003
Mar. 24	4.8	4,751	Oct. 8	21.6	77,571
Mar. 30	3.8	2,610	Oct. 10	6.6	5,977
Apr. 2	3.4	2,104	Oct. 14	14.5	43,551
Apr. 6	6.1	8,366	Oct. 18	6.4	8,285
Apr. 10	4.5	3,590	Oct. 22	6.9	8,206
Apr. 14	3.8	2,581	Oct. 26	6.4	7,906
Apr. 18	3.0	1,598	Oct. 30	6.1	6,608
Apr. 22	2.9	1,464	Nov. 3	7.5	10,170
May 3	4.6	4,395	Nov. 8	6.8	7,850
May 8	3.5	2,346	Nov. 13	6.1	6,430
May 12	2.8	1,551	Nov. 18	5.3	4,580
May 16	3.1	1,841	Nov. 24	5.1	4,219
May 19	10.7	22,527	Nov. 28	4.6	3,451
June 2	7.0	14,053	Dec. 2	4.3	2,925
June 6	5.6	6,526	Dec. 6	4.2	2,753
June 10	4.2	3,122	Dec. 12	4.1	2,571
June 14	3.8	2,683	Dec. 16	4.0	2,416
June 18	5.9	7,658	Dec. 20	3.8	2,152
June 22	6.0	5,474	Dec. 27	3.7	2,022
June 26	5.5	4,431			

Daily gage height, in feet, of Rio Grande near Roma, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	2.6	3.45	3.3	3.2	6.4	5.3	6.3	6.65	4.5	6.35	4.3
2	3.0	2.6	3.35	3.3	3.75	6.55	5.2	6.7	6.5	5.1	6.7	4.3
3	3.0	2.6	3.2	3.05	4.45	6.55	5.25	7.15	5.8	5.15	7.25	4.3
4	3.0	2.6	3.15	3.0	4.2	6.05	5.3	7.0	5.45	4.9	7.7	4.2
5	3.0	2.7	3.1	3.35	3.85	5.5	5.5	7.1	5.1	4.7	6.35	4.2
6	3.0	2.65	3.05	5.15	4.25	5.4	5.3	7.4	4.5	4.5	5.65	4.2
7	2.9	2.6	3.0	6.15	4.05	5.45	5.15	7.3	4.7	4.85	6.15	4.3
8	2.9	2.6	3.0	5.75	3.55	4.75	5.0	7.4	5.65	20.2	6.75	4.2
9	2.9	2.6	3.0	5.05	3.25	4.65	5.25	7.25	5.45	8.25	6.55	4.15
10	2.9	2.6	2.9	4.4	3.05	4.3	5.05	6.5	5.75	6.8	6.4	4.1
11	2.9	2.6	2.9	4.05	2.95	4.0	4.9	6.2	6.45	5.75	5.65	4.1
12	2.9	2.6	2.95	3.9	2.8	3.8	5.6	5.8	6.85	6.7	5.75	4.1
13	2.9	2.65	2.9	3.85	4.95	3.8	5.9	5.65	6.45	6.4	6.2	4.1
14	2.85	2.65	2.8	3.7	6.4	3.8	6.7	5.55	6.3	10.9	5.65	4.1
15	2.8	2.55	2.75	3.45	4.5	3.8	6.65	5.4	6.05	12.45	5.35	4.0
16	2.8	2.5	2.7	3.15	3.3	3.9	6.85	5.3	5.8	7.0	5.25	4.0
17	2.7	2.5	2.6	3.0	2.75	4.05	7.2	5.15	5.6	6.0	5.2	4.0
18	2.7	2.6	2.6	3.0	2.45	5.45	7.35	5.05	5.85	6.35	5.25	4.0
19	2.7	2.6	2.5	2.9	10.5	7.6	6.65	4.95	6.15	6.65	5.3	3.85
20	2.7	3.6	2.45	2.9	7.45	7.25	6.5	4.9	5.7	6.9	5.4	3.75

Daily gage height, in feet, of Rio Grande near Roma, Tex., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	2.7	5.3	2.4	3.0	6.4	6.4	6.4	4.75	5.6	6.65	5.35	3.7
22	2.7	4.5	2.4	2.95	6.8	6.4	6.35	4.7	5.7	6.9	5.2	3.7
23	2.7	5.35	3.0	2.9	6.05	5.7	6.45	4.6	5.45	6.65	5.1	3.85
24	2.7	4.7	4.65	2.9	5.55	5.5	7.25	4.35	5.05	6.5	5.05	3.95
25	2.7	4.15	4.25	4.35	5.35	5.4	7.35	4.05	4.95	6.35	4.95	3.95
26	2.7	3.95	3.85	4.05	5.45	5.7	8.4	3.85	4.85	6.35	4.75	3.85
27	2.7	3.75	4.2	3.85	5.65	5.95	8.0	3.65	5.05	6.35	4.65	3.7
28	2.7	3.6	4.05	3.5	5.75	5.75	7.75	3.55	4.85	6.45	4.6	3.7
29	2.7	....	3.9	3.35	5.65	5.65	7.6	3.6	4.75	6.4	4.5	3.7
30	2.7	....	3.7	3.25	5.55	5.45	7.3	4.2	4.6	6.15	4.4	3.7
31	2.65	....	3.45	....	5.8	....	7.0	6.55	....	6.05	....	3.7

RIO GRANDE NEAR BROWNSVILLE, TEX.

Location.—About a mile above Brownsville, Tex., and opposite Matamoros, Tamaulipas, Mexico; about 900 miles below El Paso.

Records available.—April 29, 1900, to December 31, 1911, except March and April, 1903.

Gage.—Vertical rod, fastened to fender pile on right bank.

Channel.—Bed is sandy and shifting; both banks are alluvial deposits and are inundated by extreme floods only; right bank is protected by piling.

Discharge measurements.—Made from cable.

Cooperation.—Station established and operated by the Mexican section of the International Boundary Commission.

Between Roma and Brownsville there are many lagoons (old river beds) into which the river water flows during moderate floods, and a large area is overflowed deeply by the higher floods. Much of this water returns slowly to the river as the flood subsides, so that the flow passes Brownsville more uniformly than it passes Roma. Large quantities of water also leave the river entirely, reaching the Gulf of Mexico through channels remote from the Rio Grande. Local run-off, however, keeps the total discharge at Brownsville well up toward the combined flow of the San Juan and the Rio Grande at Roma.

Discharge measurements of Rio Grande near Brownsville, Tex., in 1911.

[By P. Guerra.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 2	1.8	2,141	Mar. 31	4.2	3,569
Jan. 6	1.3	1,758	Apr. 3	4.0	3,503
Jan. 10	1.4	1,902	Apr. 7	1.9	2,520
Jan. 14	1.5	2,024	Apr. 11	5.3	6,120
Jan. 18	1.3	1,804	Apr. 15	2.2	2,623
Jan. 22	1.1	1,687	Apr. 19	1.3	2,299
Jan. 26	1.2	1,774	Apr. 23	1.1	2,156
Jan. 30	1.1	1,678	Apr. 27	1.5	2,437
Feb. 3	.6	1,470	May 2	5.4	6,247
Feb. 7	.4	1,357	May 6	4.1	3,596
Feb. 11	.5	1,425	May 10	3.8	3,179
Feb. 15	.3	1,311	May 14	3.6	2,929
Feb. 19	.6	1,461	May 18	5.0	5,599
Feb. 23	1.4	1,934	May 22	9.6	15,445
Feb. 27	3.0	3,133	May 26	5.7	6,663
Mar. 3	1.6	2,022	May 30	5.1	5,815
Mar. 7	1.2	1,749	June 3	5.4	6,234
Mar. 11	.4	1,365	June 7	5.2	5,734
Mar. 15	.5	1,399	June 11	3.6	2,951
Mar. 19	.6	1,452	June 15	2.1	2,538
Mar. 23	−.3	1,042	June 19	1.8	2,432
Mar. 27	2.4	2,341	June 23	6.0	7,102

Discharge measurements of Rio Grande near Brownsville, Tex., in 1911—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 27	4.5	3,872	Sept. 27	3.8	3,900
June 30	4.3	3,813	Sept. 30	3.2	3,242
July 3	4.5	3,913	Oct. 3	2.9	3,202
July 7	4.0	3,488	Oct. 7	3.1	3,184
July 11	3.7	3,034	Oct. 11	10.8	15,908
July 15	3.4	2,836	Oct. 15	4.9	4,609
July 19	8.3	10,204	Oct. 20	6.7	6,581
July 23	6.3	7,396	Oct. 24	7.9	9,281
July 27	8.6	10,476	Oct. 28	7.4	8,391
July 30	8.9	12,746	Oct. 31	7.1	8,037
Aug. 3	7.1	7,631	Nov. 4	9.55	18,364
Aug. 7	8.8	13,039	Nov. 8	6.5	7,652
Aug. 11	8.3	9,669	Nov. 12	7.8	8,740
Aug. 15	5.7	6,645	Nov. 16	5.9	5,588
Aug. 19	4.7	4,192	Nov. 20	5.2	5,072
Aug. 23	3.5	3,411	Nov. 24	5.0	4,736
Aug. 27	3.2	3,623	Nov. 28	4.5	4,355
Aug. 31	1.7	1,991	Dec. 1	3.8	4,061
Sept. 3	6.2	7,177	Dec. 5	3.6	3,793
Sept. 7	3.9	3,926	Dec. 9	3.3	3,402
Sept. 11	5.4	5,794	Dec. 17	3.1	3,143
Sept. 15	6.6	7,737	Dec. 21	2.9	3,133
Sept. 19	5.5	6,045	Dec. 25	2.8	2,881
Sept. 23	5.0	5,142	Dec. 29	2.7	2,710

Daily gage height, in feet, of Rio Grande near Brownsville, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.65	0.9	2.4	4.4	6.2	5.0	4.6	7.8	1.7	3.15	6.85	3.8
2	1.8	.75	2.05	4.7	5.35	4.95	4.6	7.7	3.2	3.05	6.35	3.75
3	1.65	.55	1.55	3.9	5.1	5.3	4.5	7.1	6.4	2.95	6.45	3.7
4	1.55	.5	1.35	2.85	4.65	5.9	4.4	7.5	6.65	2.8	8.2	3.6
5	1.45	.5	1.4	2.3	4.25	6.25	4.25	8.15	5.55	3.0	11.5	3.55
6	1.35	.5	1.45	2.0	4.0	5.95	4.05	8.4	4.9	3.2	10.1	3.35
7	1.3	.45	1.25	1.9	3.75	5.45	3.95	8.65	4.3	3.1	7.85	3.2
8	1.3	.25	.75	1.75	3.55	4.7	3.9	8.75	3.9	3.1	6.7	3.25
9	1.4	.2	.5	2.25	3.5	4.25	4.15	8.7	3.95	8.25	6.25	3.3
10	1.4	.5	.4	4.85	3.9	3.95	3.95	8.65	4.05	13.3	7.05	3.3
11	1.4	.5	.4	5.35	4.3	3.5	3.75	8.2	5.1	11.5	8.0	3.3
12	1.3	.5	.5	4.3	4.3	3.1	3.55	7.35	6.0	7.85	7.95	3.3
13	1.4	.5	.6	3.5	4.15	2.8	3.25	6.65	6.4	5.85	7.2	3.3
14	1.5	.45	.75	3.15	3.75	2.55	3.1	6.3	6.6	5.1	6.6	3.3
15	1.5	.3	.55	2.3	3.35	2.05	3.25	5.8	6.65	5.65	6.35	3.3
16	1.5	.3	.1	2.1	4.0	1.85	5.4	5.35	6.45	13.15	5.95	3.2
17	1.4	.4	.0	2.05	5.45	1.7	6.25	5.0	6.25	13.35	5.75	3.1
18	1.3	.45	.2	1.5	4.85	1.7	6.45	4.9	6.0	8.75	5.6	3.0
19	1.2	.55	.8	1.25	4.55	1.8	7.85	4.75	5.6	6.95	5.45	2.95
20	1.2	.6	.2	1.2	5.25	1.85	8.1	4.65	5.2	6.75	5.15	2.9
21	1.1	.75	.1	.95	10.2	4.05	7.2	4.4	5.25	6.9	4.95	2.9
22	1.1	.95	− .2	.95	9.7	6.55	6.5	4.0	5.25	7.3	4.7	2.75
23	1.2	1.35	− .3	1.1	7.55	6.15	6.3	3.6	4.9	7.8	4.75	2.55
24	1.2	1.65	− .1	1.2	7.4	5.45	6.35	3.4	4.2	7.9	4.95	2.5
25	1.2	2.55	.3	1.3	6.25	5.15	6.4	3.2	4.15	7.95	4.9	2.85
26	1.15	2.85	1.6	1.35	5.55	5.0	7.2	3.2	3.95	7.8	4.75	3.1
27	1.0	3.05	2.5	1.45	5.15	4.5	8.7	3.2	3.75	7.7	4.65	2.95
28	.9	3.05	3.85	1.7	5.0	4.5	9.15	2.6	3.5	7.4	4.45	2.8
29	1.1	....	4.4	5.8	5.1	4.35	9.7	2.2	3.35	7.3	4.25	2.7
30	1.1	....	4.5	6.95	5.1	4.35	8.8	1.85	3.2	7.2	3.95	2.7
31	1.0	....	4.25	....	5.1	....	7.9	1.7	....	7.05	....	2.7

SOUTH FORK OF RIO GRANDE AT SOUTH FORK, COLO.

Location.—At highway bridge half a mile west of South Fork station, in sec. 34, T. 40 N., R. 3 E. No tributaries between the station and the mouth and none for several miles above.

Records available.—August 9, 1910, to December 31, 1911. Also a number of discharge measurements made in 1909 by the United States Geological Survey.

Drainage area.—216 square miles (State engineer's report).

Gage.—Inclined staff. The original gage was washed out by flood October 5, 1911, and was replaced October 16 by a new gage at a different datum.

Channel.—Shifting during high water but fairly permanent at other times.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—Little if any water is diverted above the station, and therefore the records represent the natural run-off.

Cooperation.—Records furnished by the State engineer, by whom the station is maintained.

Discharge measurements of South Fork of Rio Grande at South Fork, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Jan. 20[a]	G. H. Russell	....	37
Feb. 26[a]	Clayton and Turner	2.00	34
Mar. 29	B. S. Clayton	1.85	139
Apr. 30	.....do	2.60	378
30	.....do	2.58	369
June 3	.....do	3.78	1,100
July 18	.....do	2.59	391
Sept. 10	.....do	1.67	110
Oct. 16	.....do	[b] 2.40	272
Nov. 19	.....do	[b] 1.92	118

[a] Ice conditions. [b] Gage heights from gage to a new datum.

Daily gage height, in feet, of South Fork of Rio Grande at South Fork, Colo., for 1911.

[Leila Singles, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0	2.2	2.2	1.8	2.9	3.85	3.8	2.2	1.95	3.0	2.0	2.0
2	2.0	2.2	2.2	1.75	2.7	3.9	3.65	2.2	1.85	2.8	2.0	2.0
3	2.0	2.2	2.2	2.0	2.7	3.85	4.4	2.3	1.95	2.25	2.0	2.0
4	2.1	2.2	2.2	2.0	3.0	3.9	4.35	2.15	1.85	2.3	2.0	2.0
5	2.15	2.2	2.2	2.0	3.7	4.05	3.85	2.1	1.75	....	2.0	2.0
6	2.2	2.2	2.2	1.9	3.6	4.25	3.4	1.95	1.8	....	2.0	2.0
7	2.25	2.2	2.2	2.15	3.45	4.4	3.6	1.9	1.75	....	2.05	2.0
8	2.25	2.2	2.2	2.0	3.6	4.55	3.15	1.9	1.75	....	2.05	2.0
9	2.25	2.2	2.2	2.0	3.3	4.85	3.3	1.9	1.65	....	2.0	1.95
10	2.3	2.2	2.3	1.9	3.7	4.35	3.1	1.9	1.65	....	2.0	1.95
11	2.3	2.2	2.3	1.7	3.45	4.75	2.9	1.8	1.65	....	2.0	1.95
12	2.3	2.2	2.25	1.95	3.5	4.65	3.1	1.7	1.65	....	2.0	1.9
13	2.3	2.2	2.2	1.9	3.45	4.55	3.35	1.75	1.65	....	2.0	1.9
14	2.3	2.2	2.2	1.9	3.5	4.25	3.25	1.9	1.6	....	2.0	1.9
15	2.3	2.2	2.2	1.9	3.6	3.6	3.4	1.7	1.6	....	2.0	1.9
16	2.25	2.2	2.2	2.0	3.3	3.55	3.15	1.6	1.55	2.4	2.0	1.9
17	2.25	2.2	2.2	2.1	3.3	3.5	3.1	1.65	1.6	2.4	2.0	2.0
18	2.25	2.2	2.15	2.35	3.35	3.5	2.75	1.55	1.6	2.3	2.0	2.3
19	2.25	2.2	2.1	2.0	3.4	3.7	2.75	1.65	2.25	2.3	2.0	2.5
20	2.25	2.2	2.0	2.25	3.3	3.65	2.75	1.65	2.15	2.3	2.0	2.6
21	2.25	2.2	1.75	2.4	3.0	3.55	2.7	2.45	2.0	2.2	2.0	2.6
22	2.25	2.2	1.65	2.35	3.1	3.75	2.7	2.4	1.95	2.2	2.0	2.65
23	2.25	2.2	1.6	2.65	3.5	3.6	2.7	2.15	1.85	2.2	2.0	2.85
24	2.25	2.2	1.6	2.6	3.4	3.5	2.8	2.05	1.5	2.1	2.0	3.0
25	2.25	2.2	1.6	2.65	3.0	3.45	2.7	1.95	1.6	2.1	2.0	3.25
26	2.25	2.2	1.5	2.7	3.55	3.5	2.6	1.8	2.05	2.1	2.0	3.5
27	2.25	2.2	1.6	2.6	3.55	3.4	2.6	1.75	2.4	2.05	2.0	3.5
28	2.25	2.2	1.65	2.75	3.65	3.25	2.55	1.85	2.25	2.05	2.0	3.55
29	2.25	....	1.85	3.15	3.6	3.15	2.45	1.95	2.1	2.0	2.0	3.6
30	2.25	....	1.9	2.8	3.5	3.6	2.45	1.95	1.8	2.0	2.0	3.6
31	2.25	....	2.1	....	3.5	....	2.3	2.0	....	2.0	....	3.6

NOTE.—Gage was washed out Oct. 5; gage heights Oct. 16 to Dec. 31 read on new gage the datum of which differs from that of the original gage. Gage heights affected by presence of ice Jan. 1 to Mar. 22 and Dec. 17 to 31.

Daily discharge, in second-feet, of South Fork of Rio Grande at South Fork, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		134	528	1,166	1,127	240	170	582	140	140
2		123	430	1,206	1,014	240	145	477	140	140
3		182	430	1,166	1,621	272	170	256	140	140
4		182	582	1,206	1,578	225	145	272	140	140
5		182	1,052	1,326	1,166	210	123		140	140
6		157	977	1,492	833	170	134		140	140
7		225	869	1,621	977	157	123		155	140
8		182	977	1,754	670	157	123		155	140
9		182	765	2,029	765	157	102		140	130
10		157	1,052	1,578	640	157	102		140	130
11		112	869	1,937	528	134	102		140	130
12		170	905	1,845	640	112	102		140	116
13		157	869	1,754	799	123	102		140	116
14		157	905	1,492	733	157	92		140	116
15		157	977	977	833	112	92		140	116
16		182	765	941	670	92	84	272	140	116
17		210	765	905	640	102	92	272	140	
18		290	799	905	454	84	92	230	140	
19		182	833	1,052	454	102	256	230	140	
20		256	765	1,014	454	102	225	230	140	
21		307	582	941	430	326	182	200	140	
22		290	640	1,090	430	307	170	200	140	
23	92	408	905	977	430	225	145	200	140	
24	92	386	833	905	477	196	75	170	140	
25	92	408	582	869	430	170	92	170	140	
26	75	430	941	905	386	134	196	170	140	
27	92	386	941	833	386	123	307	155	140	
28	102	454	1,014	733	365	146	256	155	140	
29	146	670	977	670	326	170	210	140	140	
30	157	477	905	977	326	170	134	140	140	
31	210		905		272	182		140		

Monthly discharge of South Fork of Rio Grande at South Fork, Colo., for 1911.

[Drainage area, 216 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			36.2	0.168	0.19	2,230	C.
February			33.3	.154	.16	1,850	C.
March	210		65.1	.301	.35	4,000	C.
April	670	112	260	1.20	1.34	15,500	A.
May	1,050	430	817	3.78	4.36	50,300	A.
June	2,030	670	1,210	5.60	6.25	71,900	A.
July	1,620	272	673	3.12	3.60	41,400	A.
August	326	84	169	.782	.90	10,400	A.
September	307	75	145	.671	.75	8,610	A.
October (20 days)			233	1.08	.80	9,240	A.
November	155	140	141	.653	.73	8,390	A.
December	140		106	.491	.57	6,540	B.
The periods						230,000	

NOTE.—Discharge estimated Jan. 1 to Mar. 22, and Dec. 17–31. Mean discharge, Mar. 1–22, estimated, 44 second-feet; mean discharge Dec. 17–31, estimated, 81 second-feet.

SAGUACHE CREEK NEAR SAGUACHE, COLO.

Location.—At the dam site of the Stark-Hagadorn Irrigation Co., 9 miles above Saguache. Ford Creek, the nearest important tributary, enters some distance below.

Records available.—August 7, 1910, to November 30, 1911.

Drainage area.—595 square miles (State engineer's report).

Gage.—An automatic recording gage.

Channel.—Shifting.

Discharge measurements.—Made from footbridge during high water, and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 47 second-feet from Saguache River and 29 second-feet from tributaries entering above. Below the station there are decrees for diversions of 364 second-feet from Saguache River and 278 second-feet from tributaries entering below.

Coöperation.—Records are furnished by the State engineer through the courtesy of the Stark-Hagadorn Irrigation Co.

Discharge measurements of Saguache Creek near Saguache, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Mar. 30	B. S. Clayton	0.50	39
May 1	do	.75	71
30	do	1.27	156
July 30	do	1.52	189
Sept. 11	do	.74	69
Oct. 11	do	1.04	129

Daily gage height, in feet, of Saguache Creek near Saguache, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.8	0.75	0.85	1.6	1.5	1.5	1.05	0.90	0.65
2	2.45	.85	.85	1.6	1.85	1.4	1.0	.95	.6
3	1.9	.90	.85	1.55	2.2	1.35	1.0	.9	.55
4	1.65	.75	.9	1.55	2.0	1.25	1.0	1.0	.55
5	1.95	.75	1.05	1.6	1.65	1.25	1.0	1.2	.6
6	2.05	.65	1.15	1.65	1.65	1.15	1.0	1.4	.6
7	1.9	.6	1.25	1.65	1.85	1.1	.85	1.3	.55
8	1.85	.6	1.3	1.7	1.9	1.1	.8	1.05	.55
9	2.1	.5	1.4	1.75	1.65	1.1	.85	1.0	.55
10	2.3	.5	1.35	1.8	1.5	1.1	.8	1.05	.5
11	2.3	.45	1.25	1.7	1.45	1.1	.75	1.0	.6
12	2.0	.45	1.2	1.6	1.55	1.05	.7	.9	.5
13	1.6	.4	1.2	1.6	1.5	1.2	.65	1.05	....
14	1.3	.35	1.1	1.55	1.65	1.15	.65	1.0	.65
15	.85	.4	1.15	1.7	1.6	1.15	.5	1.0	.8
16	.85	.6	1.15	1.7	1.55	1.0	.4	.95	.65
17	.7	.65	1.1	1.65	1.35	1.0	.35	.95	.9
18	.7	.65	1.1	1.7	1.5	1.05	.3	.75	.9
19	.7	.7	1.2	1.65	1.8	1.0	.3	.7	1.0
20	.7	.8	1.15	1.65	1.8	1.0	.3	.75	1.05
21	.75	.85	1.1	1.65	1.85	1.0	.3	.8	1.0
22	.8	.95	1.2	1.9	1.85	1.35	.4	.8	.95
23	.75	1.0	1.2	1.7	1.7	1.7	.65	.85	.9
24	.75	1.0	1.3	1.55	1.65	1.35	.65	.85	.85
25	.7	.85	1.35	1.5	1.65	1.15	.65	.85	.85
26	.6	.85	1.4	1.4	1.8	1.15	.65	.85	.85
27	.5	.95	1.4	1.35	1.9	1.15	.65	.85	.8
28	.5	1.0	1.35	1.3	1.7	1.1	.65	.85	.6
29	.6	1.0	1.35	1.35	1.55	1.05	.65	.8	.65
30	.6	.9	1.35	1.35	1.55	1.0	.7	.8	.65
31	.65	....	1.4	....	1.5	1.0	....	.7	....

NOTE.—Gage heights affected by ice Mar. 1 to 16 and Nov. 13 to 30.

Daily discharge, in second-feet, of Saguache Creek near Saguache, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	71	86	220	192	186	115	93	66
2	....	86	86	220	260	168	107	101	60
3	....	93	86	209	329	159	107	93	53
4	....	71	93	209	290	140	108	109	53
5	....	71	118	218	220	140	108	146	60
6	....	58	135	227	220	124	108	185	60
7	....	51	153	227	259	116	86	169	53
8	....	51	162	237	269	116	78	125	53
9	....	39	181	246	219	116	86	118	53
10	....	39	172	256	191	117	78	129	48
11	....	34	153	236	182	117	71	122	60
12	....	34	144	217	200	109	64	105	48
13	....	29	144	217	190	135	58	130	....
14	....	24	126	206	217	127	58	122	....
15	....	29	135	235	208	127	39	122	....
16	....	51	135	235	197	102	29	113	....
17	64	58	126	225	160	102	24	113	....
18	64	58	126	234	189	111	20	81	....
19	64	64	144	224	246	103	20	74	....
20	64	78	135	224	246	103	20	81	....
21	71	86	126	224	255	104	20	89	....
22	78	101	144	283	255	166	29	89	....
23	71	109	144	233	226	233	58	97	....
24	71	109	162	204	216	167	58	97	....
25	64	86	172	194	216	130	58	97	....
26	51	86	181	175	244	130	58	97	....
27	39	101	181	165	264	131	58	97	....
28	39	109	172	156	224	122	58	97	....
29	51	109	172	165	196	114	58	89	....
30	51	93	172	165	196	106	64	89	....
31	58	....	181	....	186	106	....	74	....

Monthly discharge of Saguache Creek near Saguache, Colo., for 1911.

[Drainage area, 595 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
March	78	....	59.5	0.100	0.12	3,660
April	109	24	69.3	.116	.13	4,120
May	181	86	143	.240	.28	8,790
June	283	156	216	.363	.40	12,900
July	329	160	225	.378	.44	13,800
August	233	102	130	.218	.25	7,990
September	115	20	63.4	.107	.12	3,770
October	185	74	108	.182	.21	6,640
November	66	....	47.9	.080	.09	2,850
The period	....	....	....	....	....	64,520

NOTE.—Discharge estimated Mar. 1-16 and Nov. 13-30 account of ice. Mean discharge Mar. 1-16 estimated 59 second-feet. Mean discharge Nov. 13-30 estimated 43 second-feet.

SAN LUIS CREEK AT VILLA GROVE, COLO.

Location.—Opposite Villa Grove post office, a short distance below the mouth of Kerber Creek. From September 30, 1910, to October 10, a station was maintained 5 miles south of Villa Grove, about sec. 5, T. 45 N., R. 10 E. The records at the two points are not comparable as there are court decrees for diversions of 33 second-feet between the two points.

Records available.—July 30, 1911, to November 30, 1911.

Drainage area.—218 square miles (State engineer's report).

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made from footbridge.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—There are court decrees for diversions from San Luis Creek of 31 second-feet above the station, and 114 second-feet below.

Cooperation.—Records are furnished by the State engineer, by whom the station is maintained.

Discharge measurements of San Luis Creek at Villa Grove, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 28	B. S. Clayton	1.68	48.0
Sept. 11	....do	1.22	11.4
Oct. 11	....do	1.41	24.0
Nov. 20[a]	....do	1.22	11.2

[a] Very slight ice conditions.

Daily gage height, in feet, and discharge in second-feet, of San Luis Creek at Villa Grove, Colo., for 1911.

[Grace Shepard, observer.]

Day.	July.		August.		September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.5	31	1.15	8	1.4	23	1.2	10
2			1.5	31	1.25	13	1.3	16	1.2	10
3			1.55	36	1.25	13	1.3	16	1.2	10
4			1.4	23	1.3	16	1.3	16	1.3	16
5			1.4	23	1.3	16	2.0	82	1.3	16
6			1.35	20	1.3	16	1.85	66	1.3	16
7			1.3	16	1.25	13	1.5	31	1.2	10
8			1.2	10	1.2	10	1.5	31	1.3	16
9			1.1	6	1.25	13	1.45	27	1.3	16
10			1.15	8	1.25	13	1.4	23	1.3	16
11			1.15	8	1.25	13	1.4	23	1.3	16
12			1.15	8	1.2	10	1.4	23	1.3	16
13			1.2	10	1.2	10	1.4	23	1.3	16
14			1.15	8	1.25	13	1.4	23	1.3	16
15			1.1	6	1.3	16	1.35	20	1.3	16
16			1.05	4	1.25	13	1.35	20	1.3	16
17			1.1	6	1.2	10	1.35	20	1.2	10
18			1.15	8	1.2	10	1.35	20	1.2	10
19			1.1	6	1.2	10	1.35	20	1.2	10
20			1.1	6	1.3	16	1.25	13	1.25	13
21			1.1	6	1.25	13	1.15	8	1.25	13
22			1.4	23	1.2	10	1.2	10	1.2	10
23			1.5	31	1.2	10	1.2	10	1.2	10
24			1.35	20	1.2	10	1.2	10	1.2	10
25			1.4	23	1.2	10	1.3	16	1.2	10
26			1.3	16	1.25	13	1.3	16	1.2	10
27			1.3	16	1.3	16	1.2	10	1.2	10
28			1.3	16	1.25	13	1.3	16	1.15	8
29			1.25	13	1.3	16	1.3	16	1.15	8
30	1.65	45	1.2	10	1.35	20	1.3	16	1.1	6
31	1.5	31	1.2	10			1.3	16		

Monthly discharge of San Luis Creek at Villa Grove, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
July 30-31	45	31	38.0	151
August	36	4	14.8	908
September	20	8	12.8	760
October	82	8	21.9	1,349
November	16	6	12.3	734
The period				3,902

KERBER CREEK NEAR VILLA GROVE, COLO.

Location.—6 miles above Villa Grove, about sec. 19, T. 46 N., R. 9 E.

Records available.—October 17, 1911, to December 31, 1911.

Drainage area.—80 square miles. (State engineer's report).

Gage.—Vertical staff.

Channel.—Records not sufficient to show.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes some backwater during the winter months.

Diversions.—There are court decrees for diversions of 10 second-feet from Kerber Creek above the station and 46 second-feet below.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the records are furnished.

Discharge measurements of Kerber Creek near Villa Grove, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 17	B. S. Clayton	1.01	10.0
Nov. 20[a]	do	1.10	11.6

[a] Ice conditions.

Daily gage height, in feet, of Kerber Creek near Villa Grove, Colo., for 1911.

[Mrs. Geo. Ellis, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		1.1	1.3	11		1.0	1.35	21	1.1	1.2	1.7
2		1.1	1.3	12		1.05	1.3	22	1.2	1.15	1.7
3		1.1	1.4	13		1.2	1.3	23	1.3	1.1	1.75
4		1.1	1.4	14		1.3	1.3	24	1.2	1.3	1.8
5		1.1	1.4	15		1.2	1.4	25	1.1	1.3	1.8
6		1.1	1.35	16		1.2	1.4	26	1.1	1.3	1.8
7		1.1	1.8	17	1.0	1.15	1.4	27	1.1	1.3	1.85
8		1.1	1.35	18	1.0	1.2	1.4	28	1.1	1.3	1.9
9		1.1	1.4	19	1.0	1.2	1.4	29	1.1	1.3	1.9
10		1.1	1.4	20	1.05	1.2	1.6	30	1.1	1.3	1.85
								31	1.1		1.85

NOTE.—Gage heights affected by presence of ice Nov. 13 to Dec. 31.

RIO ALAMOSA NEAR MONTE VISTA, COLO.

Location.—In the Rio Grande National Forest, in sec. 2, T. 36 N., R. 5 E., 28 miles southwest of Monte Vista, a short distance below the mouth of French Creek.

Records available.—September 30, 1911, to December 31, 1911.

Drainage area.—96 square miles (measured from Hayden's Atlas).

Gage.—Vertical staff.

Channel.—Data too few to be conclusive.

Discharge measurements.—Made from bridge 1 mile above gage during high water and by wading at ordinary stages.

Winter flow.—No information available.

Diversions.—The station is above all diversions except a ditch and flume used for hydraulic power at Terrace Reservoir, which takes water half a mile above. There are court decrees for diversions of 1,700 second-feet from Rio Alamosa below the station and 410 second-feet from tributaries entering below.

Accuracy.—Owing to the short length of records the station has not been rated and estimates of discharge are not available.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Rio Alamosa near Monte Vista, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Sept. 29	H. B. Waha	2.97	123
Nov. 20	.....do	2.40	52.2
21	.....do	2.33	48.8

Daily gage height, in feet, of Rio Alamosa near Monte Vista, Colo., for 1911.

[Geo. Fleischman, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		3.70	2.58	2.25	16		2.95	2.45	2.20
2		3.50	2.56	2.24	17		2.96	2.60	2.20
3		3.15	2.56	2.24	18		2.81	2.60	
4		3.20	2.56	2.24	19		2.79	2.60	2.20
5		11.00	2.54	2.22	20		2.76	2.40	
6		5.00	2.54	2.22	21		2.75	2.38	2.20
7			2.52	2.22	22		2.74	2.35	
8			2.47	2.22	23		2.70	2.36	2.20
9		3.80	2.47	2.21	24		2.69	2.39	2.00
10		3.65	2.45	2.22	25		2.68	2.36	2.00
11		3.40	2.42	2.20	26		2.65	2.39	
12		3.30	2.42	2.20	27		2.64	2.25	2.10
13		3.18	2.42	2.20	28		2.62	2.29	2.00
14		3.08	2.40		29	2.50	2.60	2.29	
15		3.00	2.42	2.20	30	2.84	2.58	2.28	2.00
					31		2.58		2.00

CONEJOS RIVER NEAR MOGOTE, COLO.

Location.—At Jacob's ranch, in sec. 15, T. 33 N., R. 6 E., 11 miles above Mogote. Nearest important tributary, Elk Creek, enters 5 miles above the station. From September 1, 1899, to March 31, 1900, and from April 17, 1903, to October 31, 1905, a station was maintained 4 miles below the present one. The flow at the two points is very nearly comparable, as there are no important intervening tributaries.

Records available.—March 21, 1907, to October 5, 1911.

Drainage area.—Not measured.

Gage.—Chain; datum unchanged since its establishment in 1907. The gage was washed away by a flood on October 6, 1911, and has not been replaced, as the flood so shifted the channel that a new station will have to be selected.

Channel.—Fairly permanent.

Discharge measurements.—Made from bridge at station.

Winter flow.—The river is frozen over during the winter months.

Diversions.—There are no court decrees for diversions above, but below the station there are decrees for 3,476 second-feet from the Conejos and 1,355 second-feet from tributaries entering below.

Accuracy.—Conditions are favorable for accurate results, and the estimates should be reliable.

Cooperation.—Maintained in cooperation with the State engineer.

Discharge measurements of Conejos River near Mogote, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 21[a]	G. H. Russell	[b] 0.30	50.0
Feb. 24[a]	Clayton and Turner	.50	31.0
Mar. 26	B. S. Clayton	.43	83.0
Apr. 25	.....do	1.80	661
May 28	.....do	2.60	1,570
July 2	.....do	3.25	2,590
Sept. 6	.....do	.99	259

[a] Ice conditions.

[b] Gage height taken from daily gage-height book.

Daily gage height, in feet, of Conejos River near Mogote, Colo., for 1911.

[F. Jacob, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		0.95	1.65	2.9	2.7	1.6	1.1	2.45
2		.95	1.7	3.2	3.2	1.45	1.05	2.2
3		1.0	1.9	3.2	2.85	1.4	1.15	1.85
4		.95	2.0	3.0	2.7	1.3	1.05	1.75
5		.8	2.15	3.1	2.7	1.25	1.0	4.4
6		.8	2.45	3.1	2.45	1.2	1.0	
7		.7	2.7	3.1	2.4	1.2	.9	
8		.8	2.8	3.2	2.25	1.15	.85	
9		.8	2.8	3.5	2.15	1.05	.8	
10		.8	2.7	3.4	2.1	1.0	.85	
11		.75	2.55	3.2	2.0	1.0	.8	
12	0.6	.8	2.4	3.1	2.05	1.0	.8	
13	.5	.8	2.4	3.0	2.2	1.05	.95	
14	.5	.75	2.3	2.95	2.25	.95	.8	
15	.55	.9	2.3	2.9	2.1	.9	1.05	
16	.5	1.0	2.4	2.9	2.1	.9	.95	
17	.45	1.0	2.6	2.8	2.1	.9	.9	
18	.45	1.0	2.6	2.75	2.05	.9	.8	
19	.45	1.15	2.55	2.8	2.65	1.05	1.0	
20	.45	1.45	2.5	2.9	2.4	.9	1.4	
21	.4	1.55	2.3	2.95	2.35	.95	1.2	
22	.4	1.65	2.2	3.0	2.25	1.5	1.1	
23	.45	1.7	2.4	2.9	2.05	1.7	1.1	
24	.45	1.7	2.6	2.85	2.15	1.45	1.0	
25	.45	1.75	2.8	2.7	2.0	1.45	1.0	
26	.45	1.85	2.8	2.5	2.0	1.35	1.65	
27	.5	2.0	2.65	2.4	1.85	1.25	1.45	
28	.55	1.95	2.6	2.45	1.85	1.3	1.25	
29	.7	2.0	2.6	2.5	1.8	1.25	1.3	
30	.7	1.75	2.7	2.5	1.75	1.15	1.7	
31	.8		2.8		1.6	1.05		

NOTE.—Gage heights affected by presence of ice Jan. 1 to Mar. 11. Gage washed out Oct. 6.

Daily discharge, in second-feet, of Conejos River near Mogote, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		222	560	2,010	1,710	542	290	1,370
2		222	590	2,500	2,500	455	271	1,070
3		240	750	2,500	1,940	428	311	725
4		222	835	2,170	1,710	378	271	648
5		175	980	2,330	1,710	355	253	4,500
6		175	1,340	2,330	1,370	332	253	
7		147	1,680	2,330	1,300	332	219	
8		175	1,830	2,500	1,120	311	204	
9		175	1,830	3,040	1,010	271	188	
10		175	1,680	2,850	959	253	204	
11		161	1,480	2,500	860	253	188	
12	100	175	1,290	2,330	910	253	188	
13	95	175	1,290	2,170	1,070	271	236	
14	95	161	1,160	2,090	1,120	236	188	
15	108	205	1,160	2,010	959	219	271	
16	95	240	1,290	2,010	959	219	236	
17	85	240	1,550	1,860	959	219	219	
18	85	240	1,550	1,780	910	219	188	
19	85	298	1,500	1,860	1,640	271	253	
20	85	440	1,440	2,010	1,300	219	428	
21	75	498	1,180	2,090	1,240	236	332	
22	75	560	1,070	2,170	1,120	482	290	
23	85	592	1,300	2,010	910	610	290	
24	85	592	1,570	1,940	1,010	455	253	
25	85	627	1,860	1,710	860	455	253	
26	85	701	1,860	1,440	860	403	576	
27	95	820	1,640	1,300	728	355	455	
28	108	780	1,570	1,370	728	378	355	
29	147	820	1,570	1,440	686	355	378	
30	147	627	1,710	1,440	648	311	610	
31	175		1,860		542	271		

NOTE.—Daily discharge Mar. 12 to Apr. 25 determined from 1910 rating curve. Discharge Apr. 26 to May 28 computed by indirect method for shifting channels. Discharge May 29 to Oct. 5 determined from a rating curve well defined between 188 and 3,040 second-feet.

Monthly discharge of Conejos River near Mogote, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			54.8	3,370	B.
February			44.9	2,490	B.
March			80.8	4,970	A.
April	820	147	363	21,600	A.
May	1,860	560	1,390	85,500	A.
June	3,040	1,300	2,070	123,000	A.
July	2,500	542	1,140	70,100	A.
August	610	219	334	20,500	A.
September	610	188	288	17,100	A.
October 1–5	4,500	648	1,660	16,500	A.
The period				365,000	

NOTE.—Discharge Jan. 1 to Mar. 11 estimated on account of ice. Mean discharge Mar. 1–11 estimated 46 second-feet.

CULEBRA RIVER AT SAN LUIS, COLO.

Location.—At highway bridge in San Luis, just above the mouth of Rito Seco.

Records available.—November 27, 1909, to December 31, 1911.

Drainage area.—260 square miles (State engineer's report).

Diversions.—There are court decrees for diversions of 145 second-feet from Culebra River and 32 second-feet from the tributaries. It is not known what portion of these diversions is above the station.

Cooperation.—Records furnished by the State engineer through the courtesy of the Costilla Estates Development Co.

Monthly discharge of Culebra River at San Luis, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January			36.3	2,234
February			34.4	1,911
March			39.4	2,421
April			37.6	2,240
May			75.9	4,668
June			57.5	3,424
July			74.0	4,548
August			58.3	3,614
September			33.6	2,019
October			70.6	4,390
November			42.4	2,544
December			48.0	2,978
The year			50.7	36,981

NOTE.—The above data were furnished to the State engineer by the Costilla Estates Development Co. On July 28 there was an estimated mean flood discharge for 24 hours of 2,859 second-feet and an estimated maximum discharge of 600 second-feet. On Oct. 5 there was an estimated mean flood discharge for 24 hours of 390.5 second-feet with an estimated maximum discharge of 600 second-feet.

RIO COLORADO[1] ABOVE QUESTA, N. MEX.

Location.—Three miles above Questa, in Taos County, and 3 miles above Cabresto Creek, the nearest tributary near sec. 2, T. 28 N., R. 13 E.

Records available.—October 14, 1910, to July 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading.

Winter flow.—No information available.

Diversions.—No data.

Accuracy.—Owing to the small number of gage heights, satisfactory estimates can not be made.

Cooperation.—Station maintained in cooperation with the Territorial engineer and the United States Forest Service.

Discharge measurements of Rio Colorado above Questa, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 27	G. H. Russell	0.50	11.2
Mar. 8	do	.65	16.5
Apr. 20	do	1.05	46.6
June 13	H. B. Waha	2.10	188.

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[1] Also known as Red River.

Daily gage height, in feet, of Rio Colorado above Questa, N. Mex., for 1911.

[C. V. Dickman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		0.2	0.2		1.15	2.1			
2							1.8		
3		.2				2.0	1.8		
4						1.9	1.5		1.1
5							1.8		
6					1.8		1.9		
7							1.6		
8		.4	.65						
9									
10				0.6			1.8		
11									
12							1.4		
13					1.2	2.1	1.4		
14				.3		2.05			
15				.3					
16							1.4		
17			.4						
18		.3							
19		.3				1.9	1.5		
20				1.05				−0.05	
21					.9	1.8			
22						1.9			
23					1.0		1.7		
24							1.55	1.3	
25					2.0				
26		.4				1.7		1.2	
27	0.5						1.3	1.2	
28						1.6		1.0	
29					2.2				
30									
31									

NOTE.—Gage reader reported a shift in the channel during the first part of August.

RIO COLORADO [1] BELOW QUESTA, N. MEX.

Location.—Two miles below Questa, at the head of Lower Canyon near sec. 1, T. 28 N., R. 12 E.; below all important tributaries, the nearest one above being Cabresto Creek.

Records available.—April 8, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice from about November to March.

Diversions.—There are no diversions below.

Accuracy.—Owing to radical changes in the stream bed, estimates of discharge can not be made.

Cooperation.—Station maintained in cooperation with the Territorial engineer and the United States Reclamation Service.

Discharge measurements of Rio Colorado below Questa, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Jan. 27	G. H. Russell	2.16	25.8
Mar. 8	.....do	2.24	30.5
Apr. 20	.....do	2.50	54.1
June 7	R. L. Cooper	3.10	209.

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[1] Also known as Red River.

Daily gage height, in feet, of Rio Colorado below Questa, N. Mex., for 1911.

[Narciso Virgil, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	2.2	2.1	2.5	3.1	3.2	2.8	....	2.5	2.5	3.9	3.45
2	....	2.3	2.25	2.6	3.1	3.25	2.8	....	2.4	2.4	3.9	3.55
3	....	2.15	2.35	2.6	3.1	3.25	2.8	....	2.45	2.4	3.8	3.55
4	2.2	2.15	2.3	2.5	3.1	3.25	2.8	....	2.45	2.45	3.8	3.55
5	2.15	2.2	2.3	2.5	3.2	3.2	2.8	....	2.4	4.0	3.8	3.6
6	2.15	2.15	2.3	2.5	3.45	3.15	2.8	....	2.4	5.05	3.8	3.6
7	2.15	2.3	2.3	2.5	3.65	3.15	2.75	2.5	2.4	5.25	3.8	3.6
8	2.2	2.1	2.3	2.45	3.65	3.15	2.7	2.4	2.4	4.95	3.8	3.6
9	2.1	2.1	2.3	2.4	3.7	3.15	2.7	2.4	2.45	4.7	3.8	3.6
10	2.15	2.15	2.3	2.5	3.7	3.15	2.65	2.35	2.4	4.75	3.8	3.6
11	2.3	2.15	2.4	2.5	3.6	3.15	2.6	2.3	2.4	4.7	3.8	3.6
12	2.3	2.3	2.4	2.5	3.45	3.05	2.65	2.3	2.4	4.7	3.55	3.45
13	2.4	2.2	2.4	2.5	3.35	3.05	2.65	2.35	2.35	4.6	3.7	3.45
14	2.3	2.2	2.35	2.4	3.4	3.0	2.65	2.3	2.3	4.45	3.7	3.4
15	2.25	2.2	2.2	2.4	3.45	3.0	2.65	2.3	2.4	4.35	3.7	3.4
16	2.25	2.2	2.25	2.45	3.5	3.0	2.65	2.3	2.35	4.25	3.7	3.45
17	2.25	2.3	2.3	2.5	3.45	3.0	2.65	2.4	2.3	4.2	3.7	3.45
18	2.35	2.2	2.3	2.5	3.45	2.95	2.6	2.4	2.3	4.2	3.7	3.55
19	2.2	2.15	2.3	2.5	3.4	2.9	2.6	2.35	2.3	4.2	3.7	3.6
20	2.2	2.15	2.3	2.5	3.25	2.9	2.6	2.3	2.4	4.15	3.7	3.55
21	2.2	2.15	2.4	2.6	3.2	2.9	2.7	2.3	2.3	4.1	3.7	3.5
22	2.2	2.05	2.4	2.7	3.05	2.85	2.6	2.45	2.3	4.1	3.7	3.5
23	2.3	2.0	2.4	2.8	3.05	2.85	2.7	2.7	2.3	4.1	3.7	3.45
24	2.1	2.0	2.4	2.9	3.05	2.8	2.8	2.65	2.3	4.05	3.55	3.55
25	2.1	2.15	2.3	2.95	3.05	2.75	2.7	2.8	2.3	4.05	3.55	3.6
26	2.1	2.15	2.25	2.95	3.15	2.75	2.75	2.65	2.3	4.0	3.6	3.4
27	2.1	2.25	2.2	3.0	3.25	2.75	2.7	2.6	2.3	4.05	3.65	3.25
28	2.2	2.15	2.3	3.1	3.2	2.7	2.7	2.55	2.3	4.0	3.4	3.35
29	2.2	....	2.3	3.1	3.15	2.7	2.75	2.5	2.3	4.0	3.4	3.5
30	2.2	....	2.4	3.1	3.1	2.7	2.75	2.5	2.5	3.95	3.4	3.55
31	2.2	....	2.5	....	3.1	....	2.7	2.5	....	3.9	....	3.35

NOTE.—Gage heights affected by ice Nov. 28 to Dec. 31.

HONDO CREEK NEAR ARROYO HONDO, N. MEX.

Location.—At highway bridge at Dunn's ranch, 200 yards above the mouth of the stream and 1 mile west of Arroyo Hondo post office near sec. 31, T. 27 N., R. 12 E.; no tributary between station and mouth.

Records available.—April 8, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes slight backwater during portions of the winter months.

Diversions.—None below.

Accuracy.—Owing to the shifting character of the stream and to the uncertainty regarding the accuracy of the gage heights, no estimates of discharge can be made.

Cooperation.—Station maintained in cooperation with the Territorial engineer and the United States Reclamation Service.

Discharge measurements of Hondo Creek near Arroyo Hondo, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Jan. 29	G. H. Russell	1.60	10.7
Mar. 9	.....do	1.65	12.6
Apr. 23	.....do	2.27	56.0
June 7	R. L. Cooper	2.90	129.

Daily gage height, in feet, of Hondo Creek near Arroyo Hondo, N. Mex., for 1911.

[John Dunn, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.88	1.82	1.75	2.22	2.15	3.00	....	2.00	1.25	3.00	2.15	2.00
2	1.88	1.82	1.75	2.22	2.18	3.00	2.60	2.00	2.70	3.00	2.15	2.00
3	1.92	1.82	1.72	2.25	2.18	3.00	2.25	2.00	3.40	2.90	2.15	2.00
4	1.90	1.70	1.72	2.25	2.28	3.00	2.00	2.00	4.10	2.90	2.15	2.00
5	1.68	1.70	1.95	2.30	2.28	3.10	2.00	1.95	3.20	2.90	2.15	2.00
6	1.70	1.70	1.95	2.28	2.28	3.00	1.90	1.95	2.60	2.90	2.15	2.00
7	1.70	1.70	1.95	2.20	2.30	3.00	1.82	1.95	2.60	4.25	2.15	2.00
8	1.70	1.70	1.95	2.20	2.45	3.00	1.80	1.95	2.45	4.25	2.15	2.00
9	1.70	1.70	1.80	2.20	3.40	3.00	1.80	1.85	2.20	4.25	2.15	2.00
10	1.70	1.65	1.88	2.12	3.40	3.00	3.00	1.80	2.15	4.25	2.15	2.00
11	1.70	1.65	1.88	2.12	3.20	3.00	2.50	1.80	2.15	4.25	2.15	2.00
12	1.70	1.65	1.72	2.12	3.00	3.00	2.10	1.80	2.15	4.25	2.60	2.00
13	1.75	1.65	1.72	2.12	3.00	2.90	2.22	1.70	2.10	4.25	2.20	2.00
14	1.65	1.65	1.72	2.12	3.20	2.90	2.25	1.70	2.10	4.25	2.00	1.95
15	1.65	1.65	1.72	2.08	3.20	2.90	2.25	1.65	2.05	3.10	2.00	1.95
16	1.68	1.65	1.92	2.08	3.20	3.00	2.25	1.65	2.05	3.10	2.00	1.95
17	1.70	1.62	2.05	2.08	3.20	3.90	2.18	1.65	2.05	2.50	2.00	1.95
18	1.70	1.65	2.05	2.08	3.20	3.00	3.70	1.60	2.05	2.40	2.00	1.95
19	1.70	1.65	2.05	2.02	3.30	2.90	2.32	1.60	2.00	2.20	2.00	1.95
20	1.70	1.65	2.05	2.02	3.10	2.70	2.20	1.60	2.00	2.20	2.00	1.95
21	1.60	1.65	1.88	2.02	3.00	2.60	2.20	1.55	2.00	2.20	2.00	1.90
22	1.60	1.65	1.88	2.02	3.00	2.42	2.32	1.50	2.00	2.15	2.05	1.90
23	1.60	1.70	1.88	2.02	3.00	2.15	2.25	1.50	1.95	2.15	2.05	1.90
24	1.60	1.70	1.70	2.02	3.00	2.10	2.25	1.50	1.95	2.15	2.05	1.90
25	1.68	1.65	1.70	2.02	3.20	2.05	2.25	1.40	1.95	2.15	2.05	1.90
26	1.62	1.65	1.70	2.12	3.00	2.02	2.20	1.40	2.42	2.15	2.05	1.90
27	1.62	1.65	1.92	2.15	3.00	2.00	2.15	1.40	2.45	2.15	2.05	1.90
28	1.60	1.75	2.20	2.15	3.00	1.88	2.15	1.40	2.45	2.15	2.00	1.80
29	1.77	....	2.20	2.15	3.10	1.70	2.15	1.35	3.20	2.15	2.00	1.80
30	1.85	....	2.20	2.15	3.00	2.18	2.05	1.25	3.20	2.15	2.00	1.80
31	1.85	....	2.28	....	2.90	....	2.02	1.25	....	2.15	....	1.80

NOTE.—Observer's gage heights do not agree with hydrographer's gage heights on days of measurements, and hence the entire record for 1911 is questionable and should be used with caution. Backwater from ice gorge Nov. 12 and 13.

RIO PUEBLO DE TAOS NEAR TAOS, N. MEX.

Location.—Two miles above Taos Pueblo and 4½ miles northeast of Taos at Glorieta Grove, near sec. 2, T. 25 N., R. 13 E. A number of intermittent tributaries enter above and below the station.

Records available.—December 19, 1910, to December 12, 1911. Records prior to December, 1910, fragmentary and not published.

Drainage area.—Not measured.

Gage.—An automatic recording gage installed by the United States Indian Service December 19, 1910. A vertical staff gage was installed first but was destroyed before July 12, 1910. On October 12, 1910, a new gage was installed which was referred to a datum 0.27 foot lower than the original. The automatic gage was referred to the datum of the second gage.

Channel.—Somewhat shifting, especially during high stages.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter period.

Accuracy.—The few discharge measurements indicate that there was not much shift during 1911, and therefore the estimates may be considered fairly good.

Cooperation.—Station maintained in cooperation with the Territorial engineer, United States Indian Office, and United States Forest Service.

Discharge measurements of Rio Pueblo de Taos near Taos, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Jan. 28[a]	G. H. Russell	1.11	7.8
Mar. 11	.....do	1.96	42.0
Apr. 21	.....do	2.15	57.0
June 9	R. L. Cooper	2.50	87.2

[a] Slight ice conditions.

Daily gage height, in feet, of Rio Pueblo de Taos near Taos, N. Mex., for 1911.

[B. G. Phillips, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.9	1.15	1.2	1.9	2.7	2.65	1.65	1.55	1.5	1.7	1.5	2.3
2	1.85	1.1	1.15	1.95	2.7	2.7	1.7	1.55	1.5	1.55	1.55	1.95
3	2.0	1.15	1.15	1.95	2.75	2.65	1.65	1.55	1.4	1.45	1.55	1.5
4	2.0	1.15	1.15	1.85	2.85	2.6	1.6	1.5	1.4	1.5	1.55	1.5
5	1.8	1.15	1.25	1.8	3.15	2.55	1.55	1.4	1.4	2.45	1.55	1.5
6	1.8	1.1	1.35	1.7	3.3	2.5	1.55	1.4	1.4	3.3	1.55	1.5
7	2.1	1.2	1.35	1.65	3.5	2.5	1.6	1.4	1.35	2.9	1.5	1.5
8	2.1	1.15	1.35		3.5	2.45	1.6	1.35	1.35	2.6	1.5	1.5
9	2.1	1.2	1.45		3.6	2.5	1.5	1.4	1.35	2.35	1.55	1.5
10	2.1	1.25	1.6		3.55	2.5	1.45	1.4	1.35	2.15	1.55	1.45
11	2.1	1.25	1.85		3.25	2.3	1.45	1.4	1.3	2.05	1.6	1.45
12	2.1	1.3	1.6	1.65	3.1	2.25	1.5	1.4	1.35	1.95	1.5	1.45
13	2.1	1.3	1.5	1.6	3.05	2.25	1.45	1.3	1.35	1.95	1.55	
14	2.1	1.25	1.45	1.6	2.95	2.2	1.5	1.25	1.4	1.85	1.55	
15	2.1	1.25	1.5	1.65	2.95	2.2	1.5	1.25	1.45	1.8	1.5	
16	2.1	1.25	1.55	1.75	2.95	2.2	1.5	1.25	1.4	1.7	1.55	
17	2.1	1.3	1.55	1.9	2.95	2.0	1.5	1.35	1.35	1.65	1.5	
18	2.1	1.3	1.5	1.95	2.9	2.0	1.5	1.35	1.3	1.65	1.5	
19	2.1	1.25	1.5	1.9	2.9	1.95	1.5	1.35	1.3	1.65	1.5	
20	2.1	1.35	1.55	1.95	2.8	1.9	1.6	1.2		1.65	1.45	
21	1.0	1.3	1.55	2.1	2.65	1.95	1.6	1.2		1.65	1.5	
22	1.05	1.25	1.6	2.3	2.55	1.9	1.6	1.4		1.6	1.55	
23	1.05	1.3	1.55	2.5	2.45	1.9	1.55	1.65	1.25	1.6	1.55	
24	1.1	1.35	1.55	2.45	2.45	1.85	1.7	1.6	1.2	1.6	1.5	
25	1.1	1.3	1.5	2.55	2.6	1.7	1.65	1.6	1.15	1.55	1.5	
26	1.1	1.1	1.4	2.65	2.7	1.6	1.65	1.5	1.15	1.6	1.5	
27	1.1	1.05	1.4	2.8	2.7	1.75	1.6	1.45	1.15	1.6	1.5	
28	1.05	1.0	1.45	2.85	2.65	1.65	1.65	1.4	1.25	1.6	1.5	
29	1.05		1.6	2.85	2.6	1.65	1.6	1.45	1.4	1.6	1.8	
30	1.05		1.7	2.8	2.55	1.7	1.65	1.55	1.9	1.6	2.1	
31	1.1		1.85		2.55		1.6	1.5		1.55		

NOTE.—Gage heights affected by ice to about the end of January and Dec. 13 to 31.

Daily discharge, in second-feet, of Rio Pueblo de Taos near Taos, N. Mex., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11	12	40	111	104	28	24	22	30	22	67
2	10	11	43	111	111	30	24	22	24	24	43
3	11	11	43	118	104	28	24	18	20	24	22
4	11	11	38	133	98	26	22	18	22	24	22
5	11	14	35	186	92	24	18	18	81	24	22
6	10	16	30	215	86	24	18	18	215	24	22
7	12	16	28	260	86	26	18	16	141	22	22
8	11	16	28	260	81	26	16	16	98	22	22
9	12	20	28	285	86	22	18	16	72	24	22
10	14	26	28	272	86	20	18	16	56	24	20
11	14	38	28	205	67	20	18	15	49	26	20
12	15	26	28	176	63	22	18	16	43	22	20
13	15	22	26	167	63	20	15	16	43	24	
14	14	20	26	150	59	22	14	18	38	24	
15	14	22	28	150	59	22	14	20	35	22	

Daily discharge, in second feet, of Rio Pueblo de Taos near Taos, N. Mex. for 1911—Con.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	14	24	32	150	59	22	14	18	30	24	
17	15	24	40	150	46	22	16	16	28	22	
18	15	22	43	141	46	22	16	15	28	22	
19	14	22	40	141	43	22	16	15	28	22	
20	16	24	43	125	40	26	12	15	28	20	
21	15	24	52	104	43	26	12	14	28	22	
22	14	26	67	92	40	26	18	14	26	24	
23	15	24	86	81	40	24	28	14	26	24	
24	16	24	81	81	38	30	26	12	26	22	
25	15	22	92	98	30	28	26	11	24	22	
26	10	18	104	111	26	28	22	11	26	22	
27	9	18	125	111	32	26	20	11	26	22	
28	8	20	133	104	28	28	18	14	26	22	
29		26	133	98	28	26	20	18	26	35	
30		30	125	92	30	28	24	40	26	52	
31		38		92		26	22		24		

NOTE.—Daily discharge determined from a rating curve well defined below 100 second-feet.

Monthly discharge of Rio Pueblo de Taos near Taos, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			7	430	D.
February	16	8	12.9	716	B.
March	38	11	21.5	1,320	B.
April	133	26	55.8	3,320	A.
May	285	81	147	9,040	B.
June	111	26	60.5	3,600	A.
July	30	20	24.8	1,520	B.
August	28	12	19.0	1,170	B.
September	40	11	16.8	1,000	B.
October	215	20	44.9	2,760	B.
November	52	20	24.3	1,450	B.
December	67		19.6	1,210	D.
The year	285		38.1	27,500	

NOTE.—Discharge January and Dec. 13–31 estimated on account of ice. Mean discharge Dec. 13–31 estimated 15 second-feet.

RIO PUEBLO DE TAOS AT LOS CORDOVAS, N. MEX.

Location.—At Los Cordovas, 100 feet below the mouth of Little Rio Grande and Arroyo Seco near sec. 22, T. 25 N., R. 12 E.

Records available.—April 6, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Fairly permanent; probably shifts during extreme high water.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes some backwater during a portion of the winter months.

Accuracy.—Conditions are favorable for accurate results, and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the Territorial engineer and the United States Reclamation Service.

Discharge measurements of Rio Pueblo de Taos at Los Cordovas, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 28	G. H. Russell	1.08	21.4
Mar. 12	do	1.30	50.1
Apr. 22	do	1.46	68.7
June 9	R. L. Cooper	1.70	103.

Daily gage height, in feet, of Rio Pueblo de Taos at Los Cordovas, N. Mex., for 1911.

[Alex. J. Anderson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.15	1.10	1.10	1.52	1.90	2.15	1.15	......	1.10	1.80	1.50	1.30
2	1.15	1.10	1.15	1.60	1.85	2.20	1.35	......	1.10	1.80	1.60	1.30
3	1.15	1.10	1.20	1.65	1 90	2.10	1.45	......	1.10	1.45	1.60	·1.20
4	1.15	1.10	1.25	1.60	1.95	2.05	1.40	......	1.10	1.50	1.50	1.20
5	1.15	1.18	1.32	1.52	1.95	2.00	1.35	......	1.05	2.76	1.60	1.20
6	1.15	1.12	1.48	1.50	2.10	1.85	1.40	0.90	1.00	3.10	1.60	1.25
7	1.15	1.10	1.30	1.48	2.30	1.80	1.35	.80	1.00	2.70	1.55	1.35
8	1.15	1.08	1.22	1.40	2.45	1.80	1.25	.80	1.00	2.35	1.60	1.30
9	1.35	1.08	1.28	1.40	2.60	1.80	1.30	.75	1.10	2.15	1.50	1.30
10	1.32	1.08	1.38	1.35	2.65	1.80	1.20	.75	1.00	2.00	1.50	1.35
11	1.45	1.08	1.65	1.32	2.45	1.70	1.15	.80	1.00	1.95	1.50	1.40
12	1.35	1.08	1.35	1.32	2.45	1.65	1.50	.75	1.05	1.85	1.45	1.45
13	1.28	1.12	1.42	1.35	2.40	1.55	1.40	.80	1.05	1.80	1.40	1.45
14	1.12	1.10	1.30	1.35	2.60	1.40	1.30	.75	1.05	1.80	1.45	1.35
15	1.15	1.10	1.30	1.32	2.55	1.45	1.30	.80	1.10	1.75	1.40	1.30
16	1.10	1.15	1.35	1.35	2.45	1.35	1.45	.85	1.10	1.65	1.40	1.40
17	1.10	1.12	1.32	1.40	2.45	1.30	1.25	1.56	1.00	1.60	1.40	1.35
18	1.10	1.12	1.30	1.42	2.40	1.40	1.15	1.10	1.00	1.60	1.40	1.35
19	1.10	1.12	1.35	1.40	2.35	1.35	1.25	1.00	1.00	1.55	1.40	1.30
20	1.10	1.12	1.38	1.32	2.30	1.30	1.30	.90	1.10	1.50	1.40	1.39
21	1.10	1.12	1.40	1.40	2.15	1.35	1.40	.90	1.10	1.50	1.40	1.30
22	1.10	1.10	1.42	1.50	2.05	1.30	1.35	1.00	1.10	1.40	1.45	1.30
23	1.10	1.15	1.38	1.70	1.90	1.25	1.45	1.20	1.10	1.40	1.50	1.30
24	1.10	1.15	1.35	1.80	1.80	1.20	1.50	1.20	1.05	1.40	1.45	1.50
25	1.10	1.10	1.35	1.80	1.85	1.15	1.50	1.20	1.00	1.40	1.40	......
26	1.10	1.10	1.32	1.90	1.85	1.05	1.55	1.30	1.00	1.40	1.35	1.60
27	1.08	1.10	1.30	1.90	1.90	1.00	1.55	1.30	1.00	1.65	1.30	1.60
28	1.08	1.10	1.30	2.00	1.95	1.00	1.60	1.30	1.00	1.70	1.20	1.50
29	1.10	......	1.40	2.10	1.90	1.00	1.60	1.25	1.35	1.65	1.30	1.50
30	1.10	......	1.45	1.95	1.85	1.05	1.50	1.20	1.90	1.60	1.35	1.49
31	1.12	......	1.52	......	2.00	......	1.45	1.15	......	1.55	......	1.40

NOTE.—Gage heights affected by ice Jan. 1 to 12, Feb. 22 to 24, and about Nov. 29 to Dec. 31.

Daily discharge, in second-feet, of Rio Pueblo de Taos at Los Cordovas, N. Mex., for 1910–11.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.									
1	......	300	59	1.5	3.0	4.5	4.5	15	15
2	......	270	45	1.5	1.5	4.5	4.5	15	15
3	......	242	45	1.5	1.5	4.5	9	15	15
4	......	242	33	1.5	4.5	4.5	9	15	15
5	......	229	33	1.5	4.5	4.5	6.8	15	23
6	67	216	23	1.5	4.5	4.5	4.5	15	23
7	75	216	19	1.5	4.5	4.5	6.8	15	23
8	84	204	12	1.5	4.5	4.5	4.5	15	19
9	75	229	9	1.5	1.5	4.5	6.8	15	23
10	75	192	9	4.5	1.5	4.5	6.8	15	19
11	75	192	4.5	4.5	3.0	4.5	9	15	23
12	75	192	4.5	3.0	4.5	3.0	6.8	15	19
13	129	192	4.5	4.5	4.5	1.5	6.8	15	19
14	149	192	4.5	4.5	4.5	4.5	9	15	19
15	129	216	4.5	1.5	1.5	4.5	6.8	15	23
16	120	181	4.5	1.5	4.5	4.5	6.8	15	19
17	129	170	4.5	1.5	4.5	4.5	9	15	......
18	139	149	3.0	1.5	4.5	4.5	6.8	15	......
19	149	129	3.0	1.5	4.5	4.5	9	15	......
20	170	110	1.5	1.5	4.5	4.5	9	15	......
21	192	101	1.5	1.5	4.5	4.5	9	15	......
22	204	110	1.5	1.5	4.5	4.5	12	15	......
23	192	92	1.5	1.5	4.5	4.5	12	15	......
24	192	75	1.5	1.5	4.5	4.5	15	15	......
25	204	59	1.5	1.5	4.5	4.5	12	15	......
26	242	39	4.5	1.5	4.5	4.5	15	15	......
27	242	33	4.5	1.5	4.5	4.5	12	15	......
28	270	28	1.5	1.5	4.5	4.5	15	15	......
29	300	33	1.5	1.5	4.5	4.5	12	15	......
30	315	39	1.5	6.8	4.5	4.5	15	15	......
31	......	52	......	4.5	4.5	......	15	......	......

Daily discharge, in second-feet, of Rio Pueblo de Taos at Los Cordovas, N. Mex., for 1910–11—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1911.											
1		23	23	78	149	204	28	57	23	129	75
2		23	28	92	139	216	52	48	23	129	92
3		23	33	101	149	192	67	38	23	67	92
4		23	39	92	160	181	59	28	23	75	75
5		31	48	78	160	170	52	19	19	378	92
6		25	72	75	192	139	59	9	15	495	92
7		23	45	72	242	129	52	4.5	15	360	84
8		21	35	59	285	129	39	4.5	15	256	92
9		21	43	59	330	129	45	3.0	23	204	75
10		21	56	52	345	129	33	3.0	15	170	75
11		21	101	48	285	110	28	4.5	15	160	75
12		21	52	48	285	101	75	3.0	19	139	67
13	43	25	62	52	270	84	59	4.5	19	129	59
14	25	23	45	52	330	59	45	3.0	19	129	67
15	28	23	45	48	315	67	45	4.5	23	120	59
16	23	28	52	52	285	52	67	6.8	23	101	59
17	23	25	48	59	285	45	39	85	15	92	59
18	23	25	45	62	270	59	28	23	15	92	59
19	23	25	52	59	256	52	39	15	15	84	59
20	23	25	56	48	242	45	45	9	23	75	59
21	23	25	59	59	204	52	59	9	23	75	59
22	23	23	62	75	181	45	52	15	23	59	67
23	23	20	56	110	149	39	67	33	23	59	75
24	23	20	52	129	129	33	75	33	19	59	67
25	23	23	52	129	139	28	75	83	15	59	59
26	23	23	48	149	139	19	84	45	15	59	52
27	21	23	45	149	149	15	84	45	15	101	45
28	21	23	45	170	160	15	92	45	15	110	33
29	23		59	192	149	15	92	39	52	101	30
30	23		67	160	139	19	75	33	149	92	30
31	25		78		170		67	28		84	

NOTE.—Daily discharge 1910–11 determined from a rating curve well defined below 150 second-feet. Discharge Feb. 23–24 and Nov. 29–30, 1911, estimated on account of ice.

Monthly discharge of Rio Pueblo de Taos at Los Cordovas, N. Mex., for 1910–11.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1910.					
April 6–30	315	67	160	7,930	B.
May	300	28	152	9,350	B.
June	59	1.5	11.6	690	C.
July	6.8	1.5	2.20	135	D.
August	4.5	1.5	3.92	241	D.
September	4.5	1.5	4.35	259	D.
October	15	4.5	9.23	568	D.
November	15	15	15.0	893	D.
December	23	18	18.8	1,160	C.
The period				21,200	
1911.					
January	43	15	20.7	1,270	C.
February	31	20	23.4	1,300	C.
March	101	23	51.7	3,180	B.
April	192	48	86.9	5,170	B.
May	345	129	216	13,300	B.
June	216	15	85.7	5,100	B.
July	92	28	57.4	3,530	B.
August	85	3.0	23.6	1,450	B.
September	149	15	24.3	1,450	B.
October	495	59	137	8,420	B.
November	92	30	66.1	3,930	B.
December			20.0	1,230	D.
The year	345	3.0	68.1	49,300	

NOTE.—Mean discharge Dec. 17–31, 1910, estimated 18 second-feet. Jan. 1–12, 1911, estimated 15 second-feet, and Dec. 1–31, 1911, estimated 20 second-feet, on account of ice.

RIO LUCERO NEAR TAOS, N. MEX.

Location.—Just above the headgate of the Seco ditch at the mouth of the canyon 9 miles above Taos, about sec. 11, T. 26 N., R. 13 E. No important tributaries near the station.

Records available.—December 17, 1910, to December 12, 1911, and fragmentary records from May to August, 1910.

Drainage area.—Not measured.

Gage.—An automatic recording gage, installed by the United States Indian Service December 17, 1910, referred to the datum of vertical staff gage originally installed.

Channel.—Somewhat shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes slight backwater at gage during the winter months.

Diversions.—No diversions above the station. Records represent the natural run-off. Below the station water is diverted for irrigation.

Accuracy.—Although the channel is somewhat shifting, it is probable that the estimates may be considered fair.

Cooperation.—Station maintained in cooperation with the Territorial engineer and the United States Forest Service.

Discharge measurements of Rio Lucero near Taos, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Jan. 28[a]	G. H. Russell	0.75	8.0
Mar. 11	.....do	.85	12.5
Apr. 21	.....do	1.18	29.7
June 8	R. L. Cooper	1.75	88.4

[a] Slight ice conditions.

Daily gage height, in feet, of Rio Lucero near Taos, N. Mex., for 1911.

[B. G. Phillips, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.7	0.7	0.7	1.25	1.2	1.85	1.55	1.5	1.3	1.45	1.05	1.2
2	.65	.7	.7	1.2	1.2	1.8	1.55	1.5	1.25	1.4	1.05	1.0
3	.65	.7	.7	1.15	1.2	1.8	1.55	1.5	1.2	1.35	1.05	1.0
4	.75	.7	.75	1.1	1.3	1.75	1.55	1.4	1.15	1.35	1.1	1.0
5	.9	.7	.75	1.0	1.45	1.7	1.55	1.35	1.15	[a]1.95	1.1	1.0
6	1.05	.7	.75	.95	1.5	1.7	1.55	1.3	1.15	2.3	1.05	1.0
7	1.0	.7	.75	.95	1.5	1.75	1.5	1.25	1.15	1.8	1.1	1.0
8	.75	.7	.75	.9	1.6	1.75	1.45	1.25	1.15	1.6	1.1	1.0
9	.65	.7	.8	......	1.6	1.8	1.35	1.25	1.15	1.65	1.1	1.0
10	.65	.75	.85	......	1.65	1.8	1.35	1.25	1.15	1.5	1.1	1.0
11	.65	.75	.85	......	1.65	1.75	1.35	1.25	1.1	1.4	1.05	1.0
12	.7	.75	.8	......	1.7	1.7	1.35	1.25	1.15	1.4	1.15	1.0
13	.7	.75	.8	.95	1.65	1.7	1.35	1.25	1.1	1.35	1.2	......
14	.7	.7	.8	1.0	1.65	1.7	1.35	1.2	1.1	1.3	1.15	......
15	.7	.7	.8	1.0	1.65	1.7	1.35	1.2	1.15	1.3	1.1	......
16	.65	.7	.85	1.05	1.7	1.7	1.35	1.15	1.1	1.2	1.1	......
17	.65	.7	.85	1.15	1.7	1.7	1.35	1.2	......	1.1	1.15	......
18	.65	.75	.85	1.1	1.7	1.65	1.35	1.2	......	1.1	1.15	......
19	.65	.7	.85	1.1	1.75	1.6	1.4	1.15	......	1.1	1.1	......
20	.7	.75	.85	1.15	1.7	1.6	1.5	1.1	......	1.1	1.1	......
21	.7	.75	.85	1.2	1.6	1.6	1.55	1.05	......	1.15	1.05	......
22	.7	.8	.9	1.2	1.6	1.6	1.55	1.2	......	1.1	1.05	......
23	.7	.9	.85	1.2	1.6	1.6	1.55	1.35	1.05	1.05	1.05	......
24	.7	.85	.85	1.2	1.65	1.6	1.5	1.35	1.05	1.05	1.1	......
25	.7	.8	.85	1.2	1.65	1.6	1.55	1.4	1.05	1.0	1.4	......
26	.75	.7	.8	1.2	1.75	1.55	1.6	1.4	1.0	1.05	1.35	......
27	.75	.7	.8	1.2	1.8	1.55	1.6	1.35	1.05	1.05	1.25	......
28	.75	.7	.8	1.25	1.8	1.55	1.6	1.35	1.15	1.05	1.95	......
29	.7	......	.9	1.3	1.7	1.55	1.55	1.3	1.1	1.0	2.6	......
30	.7	......	1.05	1.2	1.7	1.55	1.5	1.3	1.4	1.0	2.2	....
31	.7	......	1.2	......	1.75	......	1.5	1.25	......	......	.....	......

[a] Maximum gage height Oct. 5, 3 feet.

NOTE.—Gage heights affected by ice Jan. 1 to 7, Jan. 26 to 28, about Nov. 25 to 30, and Dec. 13 to 31.

Daily discharge, in second-feet, of Rio Lucero near Taos, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6	6	6	36	31	100	66	60	40	55	21	31
2	5	6	6	31	31	94	66	60	36	50	21	18
3	5	6	6	28	31	94	66	60	31	45	21	18
4	5	6	8	24	40	88	66	50	28	45	24	18
5	5	6	8	18	55	82	66	45	28	112	24	18
6	5	6	8	16	60	82	66	40	28	158	21	18
7	5	6	8	16	60	88	60	36	28	94	24	18
8	8	6	8	13	71	88	55	36	28	71	24	18
9	5	6	9	14	71	94	45	36	28	76	24	18
10	5	8	11	14	76	94	45	36	28	60	24	18
11	5	8	11	15	76	88	45	36	24	50	21	18
12	6	8	9	15	82	82	45	36	28	50	28	18
13	6	8	9	16	76	82	45	36	24	45	31	......
14	6	6	9	18	76	82	45	31	24	40	28	......
15	6	6	9	18	76	82	45	31	28	40	24	......
16	5	6	11	21	82	82	45	28	24	31	24	......
17	5	6	11	28	82	82	45	31	23	24	28	......
18	5	8	11	24	82	76	45	31	23	24	28	......
19	5	6	11	24	88	71	50	28	23	24	24	......
20	6	8	11	28	82	71	60	24	22	24	24	......
21	6	8	11	31	71	71	66	21	22	28	21	......
22	6	9	13	31	71	71	66	31	22	24	21	......
23	6	13	11	31	71	71	66	45	21	21	21	......
24	6	11	11	31	76	71	60	45	21	21	20	......
25	6	9	11	31	76	71	66	50	21	18	20	......
26	8	6	9	31	88	66	71	50	18	21	20	......
27	8	6	9	31	94	66	71	45	21	21	20	......
28	8	6	9	36	94	66	71	45	28	21	20	......
29	6	......	13	40	82	66	66	40	24	18	20	......
30	6	......	21	31	82	66	60	40	50	18	20	......
31	6	......	31	......	88	......	60	36	......	20	......	......

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge estimated on account of ice Jan. 4-7 and Nov. 24-30.

Monthly discharge of Rio Lucero near Taos, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	8	5	5.8	357	C.
February	13	6	7.1	394	C.
March	31	6	10.6	652	B.
April	40	13	24.7	1,470	B.
May	94	31	71.6	4,400	B.
June	100	66	79.6	4,740	B.
July	71	45	57.9	3,560	B.
August	60	21	39.3	2,420	B.
September	50	18	26.5	1,580	B.
October	158	18	43.5	2,670	B.
November	31	20	23.0	1,370	C.
December [a]	......	......	15.0	922	D.
The year	158	5	33.9	24,500	

[a] Estimated.

HORN RIVER[1] NEAR CANJILON, N. MEX.

Location.—In the Carson National Forest, at Canjilon ranger station, in sec. 2, T. 26 N., R. 5 E., 5 miles northeast of Canjilon; no important tributaries near by.

Records available.—June 19, 1911, to September 30, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Not sufficient data to indicate.

Discharge measurements.—Made by wading.

Diversions.—No water diverted above the station; the records represent the natural run-off.

Accuracy.—Owing to a lack of discharge measurements, no estimates of daily or monthly discharge can be made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. B. Waha:

June 19, 1911: Gage height, 1.79 feet; discharge, 5.6 second-feet.

Daily gage height, in feet, of Horn River near Canjilon, N. Mex., for 1911.

[L. A. Shartzer, observer.]

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		1.68		1.41	16		1.70	1.42	1.40
2		1.74		1.37	17		1.66	1.42	
3		1.77		1.46	18		2.12		1.41
4		1.72	1.46	1.45	19	1.76	2.05		1.43
5		1.62	1.46	1.44	20	1.74	1.82	1.44	
6		1.82	1.45	1.43	21	1.76	1.80		
7		1.84	1.43	1.41	22	1.73	1.75	2.15	1.39
8		1.68	1.42		23	1.72	1.72	1.74	1.40
9		1.64	1.41	1.40	24	1.59	1.68	1.67	1.38
10		1.60	1.39		25	1.58	1.78	1.67	
11		1.59	1.38	1.39	26	1.57		1.66	1.51
12		1.60	1.38		27	1.60	1.92	1.52	1.65
13		1.75	1.48	1.39	28	1.58	1.78	1.49	
14		1.68	1.47	1.38	29	1.69	1.68	1.48	
15		1.65			30	1.68	1.62	1.47	2.05
					31		1.52	1.43	

RIO VALLECITOS AT VALLECITOS, N. MEX.

Location.—At Vallecitos, in sec. 17, T. 26 N., R. 8. E., in the Carson National Forest.

Records available.—June 17, 1911, to December 5, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Not sufficient data to indicate.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—Water is diverted in small amounts for a distance of 6 miles above the station.

Accuracy.—Owing to a lack of discharge measurements, no estimates of daily or monthly discharge are available at present.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

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[1] Rio Canjilon.

The following discharge measurement was made by H. B. Waha:
June 17, 1911: Gage height, 1.63 feet; discharge, 27.7 second-feet.

Daily gage height, in feet, of Rio Vallecitos at Vallecitos, N. Mex., for 1911.

[C. E. Hulbert, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	1.17	1.32	1.20	......	1.54	1.50	16	......	1.82	.94	1.25	1.50	......	......
2	......	1.55	1.28	1.04	1.40	......	1.57	17	1.63	1.50	.98	1.13	......	......	......
3	......	1.46	1.24	1.06	1.23	1.45	1.56	18	1.61	1.55	.92	1.08	1.63	......	......
4	......	1.35	1.35	1.06	1.20	1.46	1.56	19	1.56	1.58	1.06	1.08	......	......	......
5	......	1.27	1.14	1.06	......	......	1.55	20	1.48	1.73	1.07	1.42	1.51	1.59	......
6	......	3.30	1.13	1.26	2.33	1.41	......	21	1.46	1.57	.96	1.20	1.42	1.56	......
7	......	1.50	1.08	1.14	2.26	1.40	......	22	1.44	1.56	1.38	1.14	1.46	1.56	......
8	......	1.41	1.06	1.10	2.11	1.52	......	23	1.40	1.48	1.45	1.12	1.44	1.54	......
9	......	1.32	.92	......	1.96	1.52	......	24	1.37	1.83	1.29	1.16	......	1.52	......
10	......	1.26	.93	1.07	1.82	1.53	......	25	1.25	1.63	1.26	1.17	1.38	1.50	......
11	......	1.20	.95	1.07	1.74	......	......	26	1.17	2.20	1.18	1.14	......	......	......
12	......	1.27	1.12	1.08	1.68	......	......	27	1.16	1.56	1.13	1.25	1.47	1.60	......
13	......	1.26	1.03	1.28	1.62	......	......	28	1.16	1.65	1.21	1.18	1.45	1.60	......
14	......	1.64	.92	1.16	1.58	......	......	29	1.16	......	1.18	1.22	......	......	......
15	......	1.45	.90	1.26	1.53	......	......	30	1.22	......	1.09	1.28	1.64	1.58	......
								31	......	......	1.10	......	1.59	......	......

SANTA FE CREEK AT MONUMENT ROCK, NEAR SANTA FE, N. MEX.

Location.—At Monument Rock, a large conspicuous bowlder 7 miles above Santa Fe, in sec. 30, T. 17 N., R. 11 E. No tributaries within several miles of the station. From June 1, 1907, to July 16, 1910, and March 8 to November 12, 1911, a station was maintained at Santa Fe. Between the two stations there are no important tributaries, but the Santa Fe Water & Light Co. diverts water.

Records available.—August 29, 1910, to February 25, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made from footbridge.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—Little or no water is diverted above the station, and therefore the records represent closely the natural run-off.

Accuracy.—Owing to the meager data, no estimates of discharge are made for 1911.

Cooperation.—Station maintained in cooperation with the Territorial engineer.

A record of gage heights from February 5 to 25, 1911, showed an average stage of 0.8 foot.

Discharge measurements of Santa Fe Creek at Monument Rock, near Santa Fe, N. Mex., for 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Mar. 8[a]	Cooper and Meier	....	7.1
Aug. 7	W. B. Freeman	....	[b]7.0

[a] Measurement made 1 mile above Santa Fe Water & Light Co.'s reservoir in Santa Fe Canyon. Gage at Don Gaspar bridge in Santa Fe read 0.60 feet.
[b] Estimated.

SANTA FE CREEK AT SANTA FE, N. MEX.

Location.—At Don Gaspar Avenue Bridge in Santa Fe, in sec. 24, T. 17 N., R. 9 E. No tributaries within several miles of this station.

Records available.—Fragmentary records from May 31, 1907, to November 12, 1911.

Drainage area.—About 40 square miles.

Gage.—The datum of the original staff gage was changed August 13, 1908, and again August 22, 1908. Since that time it has remained permanent.

Channel.—Shifting.

Discharge measurements.—Made from bridge and by wading.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—Water is diverted for the Santa Fe waterworks above the station and one small irrigation ditch diverts just above.

Accuracy.—Owing to the lack of gage heights, no estimates of daily discharge have been made.

Cooperation.—Maintained in cooperation with the Territorial engineer.

Discharge measurements of Santa Fe Creek at Santa Fe, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 4	W. B. Freeman		0	Aug. 1	W. B. Freeman		[a] 0.25
5	do		0	2	do		[a] .10
6	do		0	3	do		[a] .05
7	do		0	4	do		[a] .10
8	do	0.60	9.7	5	do		[a] .05
8	do		[a] 10.0	6	do		[a] .05
19	do	.30	6.0	8	do		[a] .05
June 1	do	.72	18.9	Sept. 23	do		0
July 23	do		[a] 6.0	Oct. 27	do	0.10	[a] 7.0
24	do		[a] 6.0	28	do	.20	[a] 9.0
25	do		[a] 6.0	30	do	.50	[a] 8.0
26	do		[a] 4.0	Nov. 3	do	.10	[a] 7.0
27	do		[a] 3.0	11	do		[a] 10.0
29	do		[a] 8.0	12	do		[a] 9.0
30	do		[a] 8.0	12	do	.40	[a] 12.0
31	do		[a] 3.0				

[a] Estimated.

Daily gage height, in feet, of Santa Fe Creek at Santa Fe, N. Mex., for 1911.

[A. S. Kirkpatrick, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1				0.70					
2				.50					
3				.40					0.10
4									
5				.40					
6				.20					
7									
8	0.60								
9									
10									
11									
12									.40
13									
14									
15			0.10						
16			.30						
17			.40						
18			.50						
19	.30								
20			.80						

Daily gage height, in feet, of Santa Fe Creek at Santa Fe, N. Mex., for 1911—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
21			0.50						
22									
23									
24									
25			.58						
26			.55						
27			.42					0.10	
28			.80					.20	
29			.55					.50	
30			.45	1.90					
31			.68						

NOTE.—No flow in the creek from June 7 to 29.

RIO SAN ANTONIO NEAR ORTIZ, N. MEX.

Location.—At the lower San Antonio ranger station in the Carson National Forest, in sec. 1, T. 30 N., R. 7 E.; nearest tributary, a small stream entering from the south just above the station; Nutritus Creek enters 2 miles above.

Records available.—June 16, 1911, to November 27, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months, and the records are discontinued.

Diversions.—Four small diversions above the station.

Accuracy.—Owing to lack of discharge measurements no estimates of flow are available at present.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. B. Waha:

June 16, 1911: Gage height, 1.10 feet; discharge, 8.5 second-feet.

Daily gage height, in feet, of Rio San Antonio near Ortiz, N. Mex., for 1911.

[T. A. Graham, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		1.0	1.1			1.0	16	1.1	1.1	0.0	0.8		
2		1.1	1.0	1.1		1.0	17	1.1	1.1				1.1
3		1.1	1.0	.0	0.8		18	1.1	1.15		.8		1.1
4			1.0	.4	.8	1.0	19	1.1	1.15		.8		1.0
5		1.0	1.0	.8			20	1.0	1.0		.8		1.0
6		1.05	.0	.8			21	1.0	1.0				1.1
7		1.05	.0	.8			22		1.05				
8		1.0	.0	.82			23	1.0	1.15			0.0	
9		1.0	.0	.8			24	1.0	1.25				
10		1.1	.0				25	1.0	1.25		.8	1.0	1.2
11		1.1	.0				26	.0	1.2		.8	1.1	1.1
12		1.1	.0				27	.5	1.2		.8	1.1	1.1
13		1.55	.0				28	.5	1.15		.8	1.1	
14		1.35	.0			1.1	29	.0	1.1		.8		
15		1.1	.0				30	1.0	1.1		.8	1.1	
							31		1.1			1.0	

[a] Maximum gage height, 5.6 feet Sept. 30.

NOTE.—No flow in the river from Aug. 5 to Oct. 3, where the gage heights are omitted.

RIO PUERCO AT RIO PUERCO, N. MEX.

Location.—At the Atchison, Topeka & Santa Fe Railway bridge between Pavo and Rio Puerco, in sec. 31, T. 7 N., R. 1 W.; nearest tributary, a small stream entering from the west just below; San Jose River enters about 6 miles above.

Records available.—Fragmentary records September 7, 1910, to October 2, 1911.

Drainage area.—Not measured.

Gage.—Automatic recording gage.

Channel.—Somewhat shifting.

Discharge measurements.—Made by wading.

Accuracy.—Owing to the meager data no estimates of discharge can be made.

Cooperation.—Station maintained in cooperation with the Territorial engineer.

Discharge measurements of Rio Puerco at Rio Puerco, N. Mex., in 1911.

Date.	Hydrographer.	Gage.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 6	G. H. Russell		0
Sept. 2	.....do		0

Daily gage height, in feet, of Rio Puerco at Rio Puerco, N. Mex., for 1911.

[Chas. Lembke, observer.]

Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.
1			2.05	11				21	1.65		
2			1.85	12				22	1.45		
3				13				23			
4				14				24	3.3		
5		1.1		15				25	2.4		
6		1.1		16				26	1.6		
7				17				27	1.2		
8				18				28	.9		
9				19	2.45			29	.8		
10				20	2.0			30	.7	[a]2.3	
								31	.65		

[a] Estimated.

RIO PUERCO NEAR LA JOYA, N. MEX.

Location.—At the Atchison, Topeka & Santa Fe Railway bridge 2 miles north of La Joya railway station, in sec. 20, T. 2 N., R. 1 E.; 1 mile above the mouth of the river; above all tributaries; no important tributaries for several miles above.

Records available.—Fragmentary records September 10, 1910, to November 9, 1911.

Drainage area.—Not measured.

Gage.—Automatic recording gage.

Channel.—Very shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months, and the records are discontinued.

Accuracy.—Owing to the extreme changes in conditions and the few measurements, it is not possible to make estimates of discharge.

Cooperation.—Station maintained in cooperation with the Territorial engineer.

Discharge measurements of Rio Puerco near La Joya, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Feb. 14	C. B. Digby		[a]0.25
Mar. 22	G. H. Russell	3.10	89.8
Aug. 6	do	4.40	[a]2.0
Nov. 1	W. B. Freeman	4.75	34.8

[a] Estimated.

Daily gage height, in feet, af Rio Puerco near La Joya, N. Mex., for 1911.

[S. C. Elliott, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1						6.0	4.7	6.8	4.75
2					5.8	5.9	4.7	6.8	4.7
3					[a]6.7	5.8	4.6	6.8	4.65
4					6.0	5.7	4.6	6.8	4.6
5					5.0	4.9	4.5	6.0	4.55
6						4.8	4.5	5.5	4.5
7						4.8	4.4	5.5	4.45
8	2.7					4.7	4.4	4.8	4.4
9	3.2		5.1		5.1	4.7	4.4	4.7	4.35
10	3.25		5.1		5.0	4.6	4.7		
11	3.2		5.1			4.4	4.7		
12	3.35		5.1			4.3	4.6		
13	3.4		5.0		6.45	4.1	4.6		
14	3.45		5.0		6.9	4.0	4.5		
15	3.5		4.9		[b]8.0	3.8	4.5		
16	3.45		5.2		6.2	3.6	4.5		
17	3.2		5.3		6.6	3.3	4.5		
18	3.0		5.2		5.4	6.3	4.6		
19	2.95	5.3	5.1		5.6	5.9	4.6		
20	3.0	5.1	5.1		6.8	5.8	4.7		
21	3.05	5.0			7.4	5.2	4.7		
22	3.1				7.95	5.1	4.7		
23	3.0				6.1	6.8	4.7		
24	3.0				6.1	7.4	4.6		
25	2.5				6.4	7.2	4.6		
26	2.9				7.4	6.8	4.6		
27	2.8				6.8	6.2	4.6		
28	2.8				6.1	5.5	4.5		
29	2.7			5.1	6.0	5.0	4.5		
30	2.6				5.9	4.9	5.6		
31					6.1	4.8			

[a] Approximate maximum gage height July 3, 8.0 feet.
[b] Maximum gage height July 15, 10.0 feet.

NOTE.—No flow in the river where gage heights are omitted except Oct. 29, 30, and 31, when there was a small flow.

SAN JOSE RIVER NEAR SUWANEE, N. MEX.

Location.—Two miles below the railroad station at Suwanee, near sec. 29, T. 8 N., R. 2 W.; about 6 miles above the mouth of the river and 3 miles below the Rio Lucero.

Records available.—Fragmentary records August 30, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Automatic recording gage.

Channel.—Shifting.

Discharge measurements.—Made by wading.

Accuracy.—Owing to the shifting character of the stream, and the lack of discharge measurements, no estimates of discharge can be made.

Cooperation.—Station maintained in cooperation with the Territorial engineer.

Discharge measurements of San Jose River near Suwanee, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 10	G. H. Russell	0.52	[a] 1.5
Sept. 2	.....do	.50	[a] 1.5
Nov. 2	W. B. Freeman	1.20	18.5

[a] Estimated.

Daily gage height, in feet, of San Jose River near Suwanee, N. Mex., for 1911.

[Chas. Lembke, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.80	1.80		0.98	16	0.65	1.00		1.10	0.48
2		.50	1.20	1.30		17	[a] 3.10	.85		1.10	.48
3		.50		1.22		18	4.00	.80		1.10	.50
4		1.50		1.22		19	2.40	1.00		1.10	.50
5		1.10		1.40		20	1.80	[b] 2.50		1.10	.48
6		.80		1.50		21	2.10	1.30		1.05	.25
7		.50		1.20		22	[c] 2.90	1.10		1.05	.22
8		.50		1.15		23	3.20	1.00		1.05	.20
9		.50		1.10		24	3.70	.80		1.02	.21
10	0.50	.60		1.05		25	3.60	.80		1.00	.28
11	.50	.80		1.05		26	2.30	.80		1.00	.23
12	.50	1.10		1.05		27	1.80	1.00		1.00	.33
13	.50	1.20		1.05		28	1.40	1.30		1.00	.35
14	.70	1.80		1.05		29	1.30	1.30		.98	.32
15	.50	1.30		1.05	.50	30	1.25	3.00		.98	.38
						31	1.10				.38

[a] Maximum gage height Aug. 17, 6.2 feet.
[b] Maximum gage height Sept. 20, 3.9 feet.
[c] Maximum gage height Aug. 22, 4.8 feet.

PECOS RIVER BASIN.

PECOS RIVER AT COWLES, N. MEX.

Location.—At highway bridge about sec. 28, T. 18 N., R. 12 E., three-fourths mile below Cowles post office; midway between Espiritu Santo and Willow creeks.

Records available.—March 9, 1910, to December 15, 1911.

Drainage area.—Not measured.

Gage.—Automatic recording gage.

Channel.—Fairly permanent except during high water, when it may shift slightly.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during a portion of the winter months.

Accuracy.—Conditions are favorable for accurate results, and the records should be reliable.

Cooperation.—Maintained in cooperation with the Territorial engineer.

Discharge measurements of Pecos River at Cowles, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 5[a]	C. B. Digby	2.10	21.1
Mar. 31	R. L. Cooper	1.30	66.1
May 25	.....do	2.25	256
June 9	Jones and Jones	1.74	157
16	G. H. Russell	1.65	124
Aug. 7	W. B. Freeman	1.70	134
Oct. 31	.....do	1.47	75.2

[a] Ice present.

Daily gage height, in feet, of Pecos River at Cowles, N. Mex., for 1911.

[E. Rivera, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	0.9	1.25	1.35	1.7	2.7	1.65	......	......	......	1.5	1.6
2	......	.9	1.2	1.3	1.75	2.55	2.1	......	1.2	......	1.45	1.6
3	......	.9	1.2	1.3	1.8	2.4	1.85	......	......	......	1.55	1.6
4	......	.9	1.05	1.25	2.05	2.3	1.6	......	......	......	1.5	1.6
5	2.1	.9	.95	1.15	2.25	2.25	1.7	1.8	......	......	1.5	1.6
6	2.1	.9	1.0	1.15	2.55	2.2	1.9	......	......	......	1.5	1.6
7	2.1	.95	1.0	1.1	2.8	2.1	1.9	1.7	......	2.4	1.5	1.6
8	2.1	.9	1.0	1.1	2.95	2.1	1.8	......	1.2	......	1.45	1.55
9	2.0	.9	1.0	1.1	3.05	2.0	1.85	......	1.2	......	1.45	1.35
10	2.1	.95	1.1	1.15	2.9	1.95	1.75	......	......	......	1.45	1.35
11	2.2	.9	1.1	1.2	2.75	1.9	1.9	......	......	......	1.35	1.35
12	2.1	.8	1.0	1.2	2.65	1.8	1.95	1.5	......	......	1.4	1.35
13	1.6	.8	.95	1.2	2.6	1.75	2.25	......	......	......	1.45	1.35
14	1.1	.8	.9	1.2	2.75	1.7	2.45	......	......	1.4	1.45	1.35
15	.85	.8	.95	1.3	2.85	1.7	2.75	......	......	......	1.45	1.35
16	.8	.8	1.0	1.35	2.75	1.65	[a]3.2	......	1.2	......	1.45	......
17	.8	.8	1.0	1.4	2.7	1.6	2.85	......	......	......	1.6	......
18	.85	.8	1.0	1.35	2.7	1.6	2.6	......	......	......	1.6	......
19	.85	.78	1.0	1.4	2.6	1.6	2.6	1.5	......	......	1.6	......
20	.9	.78	1.0	1.5	2.45	1.6	2.55	......	......	......	1.6	......
21	.9	.77	1.0	1.55	2.35	1.65	2.5	1.3	......	1.75	1.6	......
22	.9	.9	1.0	1.7	2.25	1.6	2.45	......	......	......	1.6	......
23	.9	1.15	1.0	1.7	2.2	1.55	2.35	......	1.2	......	1.55	......
24	.95	1.3	1.0	1.6	2.25	1.5	3.0	......	......	......	1.6	......
25	.95	1.3	1.0	1.6	2.3	1.5	2.8	......	......	......	1.65	......
26	.9	1.3	1.0	1.6	2.3	1.45	2.6	1.35	......	......	1.6	......
27	.95	1.25	1.0	1.7	2.3	1.45	2.5	......	1.3	......	1.6	......
28	.9	1.25	1.05	1.8	2.3	1.4	......	......	......	1.7	1.6	......
29	.9	......	1.15	1.75	2.4	1.4	2.7	......	......	......	1.6	......
30	.95	......	1.25	1.65	2.35	1.4	......	......	1.4	......	1.6	......
31	.9	......	1.35	......	2.7	......	......	......	......	1.5	......	......

[a] Maximum gage height July 16, 3.5 ft. Staff gage read July 29 to Oct. 28.

NOTE.—Gage heights affected by ice Jan. 5 to 14 and Dec. 16 to 31.

Daily discharge, in second-feet, of Pecos River at Cowles, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	20	62	79	149	433	122	338	45	93	80	99
2	......	20	55	70	160	384	227	308	45	112	72	99
3	......	20	55	70	172	337	166	253	45	122	90	99
4	......	20	36	62	236	307	112	202	45	144	80	99
5	......	20	25	48	292	292	133	155	45	202	80	99
6	......	20	30	48	384	278	178	144	45	523	80	99
7	......	25	30	42	467	250	178	133	45	295	80	99
8	......	20	30	42	520	250	155	122	45	189	72	90
9	......	20	30	42	491	223	166	112	45	131	72	56
10	......	25	42	48	443	210	144	102	45	110	72	56
11	......	20	42	55	397	197	178	102	45	90	56	56
12	......	13	30	55	367	172	190	93	45	80	63	55
13	......	13	25	55	352	144	266	93	45	72	72	56
14	......	13	20	55	397	133	323	93	45	63	72	56
15	16	13	25	70	428	133	416	93	45	63	72	56
16	13	13	30	79	397	122	560	93	45	63	72	......
17	13	13	30	88	382	112	448	93	45	63	99	......
18	16	13	30	79	382	112	369	93	45	63	99	......
19	16	12	30	88	352	112	369	93	45	63	99	......
20	20	12	30	107	309	112	354	75	45	80	99	......
21	20	11	30	117	281	122	338	59	45	131	99	......
22	20	20	30	149	254	112	323	59	45	120	99	......
23	20	48	30	149	240	102	294	59	45	120	90	......
24	25	70	30	127	254	93	496	59	45	120	99	......
25	25	70	30	127	267	93	432	59	45	120	110	......
26	20	70	30	127	267	84	369	67	52	120	99	......
27	25	62	30	149	267	84	338	59	59	120	99	......
28	20	62	36	172	267	75	369	52	59	120	99	......
29	20	......	48	160	295	75	400	45	67	110	99	......
30	25	......	62	138	281	75	400	45	75	99	99	......
31	20	......	79	......	382	......	369	45	......	80	......	......

NOTE.—Daily discharge determined from three fairly well-defined rating curves applicable as follows: No. 1, Jan. 15 to May 8 and June 1 to June 12; No. 2, May 9 to 31 and Oct. 6 to Dec. 15; No. 3, June 13 to Oct. 5. Discharge for the periods during which gage was not read determined by comparison with records of Pecos River at Anton Chico and Gallinas River at Las Vegas.

Monthly discharge of Pecos River at Cowles, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	25	13	19.5	1,200	C.
February	70	11	27.1	1,510	C.
March	79	20	36.2	2,230	C.
April	172	42	89.9	5,350	B.
May	520	149	327	20,100	B.
June	433	75	174	10,400	B.
July	560	112	296	18,200	B.
August	338	45	110	6,760	C.
September	75	45	47.9	2,850	C.
October	523	63	125	7,690	C.
November	110	56	85.8	5,110	B.
December	99	....	58.5	3,600	C.
The year	560	11	117	85,000	

NOTE.—Mean discharge Jan. 1 to 14 estimated 19 second-feet, and Dec. 16 to 31 estimated 40 second-feet on account of ice.

PECOS RIVER NEAR ANTON CHICO, N. MEX.

Location.—About 1 mile below the settlement of Tecolotito, about sec. 31, T. 12 N., R. 17 E., about 3 miles northwest of Anton Chico; 1½ miles below the mouth of Tecolote Creek.

Records available.—April 28, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Automatic recording gage, which was moved three-fourths of a mile downstream on May 15, 1911, and referred to a new datum.

Channel.—Apparently permanent.

Discharge measurements.—Made from car and cable during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater at times during the winter months.

Accuracy.—As the station has not been completely rated no estimates of discharge are available at present.

Cooperation.—Maintained in cooperation with the Territorial engineer and V. K. Jones, Las Vegas, N. Mex.

Discharge measurements of Pecos River near Anton Chico, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 9	C. B. Digby	−0.20	17.6
Mar. 29	R. L. Cooper	.12	41.0
May 13	G. H. Russell	3.60	2,380
17	.....do	2.20	378
13[a]	.....do	3.20	2,380
17	.....do	2.43	378
June 2	Jones and Jones	2.60	520
July 28	G. H. Russell	2.54	545
Sept. 16	V. K. Jones	1.44	30.6
Oct. 28	.....do	1.70	148

[a] Float measurement.

NOTE.—First four measurements referred to original gage: last six measurements referred to new gage.

Daily gage height, in feet, of Pecos River near Anton Chico, N. Mex., for 1911.

[J. M. Abercrombie, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	—0.15	—0.20	—0.10	0.70	1.60	2.50	1.80	2.20	1.50	1.65	1.75	1.80
2	— .15	— .20	— .10	.90	1.55	2.35	2.90	2.15	1.50	1.75	1.75	1.80
3	— .15	— 20	— .10	1.00	1.60	2.30	2.90	2.10	1.50	1.70	1.75	1.80
4	— .15	— .20	— .10	1.15	1.65	2.30	2.60	2.05	1.65	1.65	1.75	1.80
5	— .15	— .20	— .15	1.10	1.90	2.25	2.30	1.90	1.60	2.45	1.80	1.90
6	— .15	— .20	00	.95	1.95	2.20	2.20	1.85	1.55	3.65	1.85	1.80
7	— .15	— .20	.15	.85	2.00	2.20	2.20	1.80	1.55	2.90	1.80	1.80
8	— .20	— .20	.35	.95	2.00	2.20	2.20	1.75	1.55	2.45	1.80	1.80
9	— .20	— .20	.37	1.05	2.10	2.15	2.20	1.70	2.05	2.25	1.85	1.75
10	.05	— .20	.37	1.00	2.10	2.10	2.20	1.70	1.70	2.15	1.80	1.75
11	.10	— .20	.50	.90	2.20	2.10	2.20	1.70	1.55	2.05	1.85	1.75
12	.08	— .20	.85	.85	2.40	2.10	2.30	1.65	1.55	2.00	1.85	1.95
13	.10	— .20	.80	.85	3.00	2.10	2.30	1.65	1.55	1.95	1.85	2.00
14	.10	— .20	.62	.90	2.70	2.05	2.40	1.65	1.55	1.90	1.95	2.00
15	.05	— .20	.42	.85	2.60	2.00	2.40	1.60	1.55	1.85	1.90	2.00
16	.00	— .15	.30	.80	2.50	2.00	2.40	1.65	1.50	1.80	1.85	2.00
17	— .05	— .10	.32	.80	2.45	2.00	2.55	1.75	1.50	1.80	1.85	2.00
18	— .10	00	.35	.85	2.40	2.00	2.55	1.85	1.50	1.80	1.80	2.00
19	— .10	00	.40	.85	2.40	[a]2.20	2.45	1.80	1.45	1.75	1.80	2.00
20	— .15	— .10	.40	.75	2.35	2.00	3.30	1.70	1.55	1.75	1.80	2.00
21	— .20	— .20	.40	.85	2.30	2.20	2.80	1.65	1.50	1.75	1.80	2.00
22	— .20	— .20	.40	.95	2.30	2.10	[b]2.80	1.60	1.50	1.70	1.80	2.00
23	— .20	— .20	.40	1.15	2.20	2.00	2.35	1.65	1.50	1.70	1.80	2.00
24	— .20	— .20	.40	1.45	2.20	1.90	2.50	1.75	1.50	1.70	1.80	2.00
25	— .20	— .15	.35	1.45	2.20	1.80	2.45	1.70	1.50	1.70	1.75	1.95
26	— .20	— .05	.30	1.45	2.20	1.80	2.35	1.60	1.50	1.70	1.75	1.90
27	— .20	— .15	.25	1.40	2.20	1.80	2.25	1.55	1.50	1.90	1.90	1.85
28	— .20	— .10	.25	1.40	2.70	1.95	2.40	1 55	1.50	1.80	1.80	1.85
29	— .20	....	.25	1.55	2.95	1.80	2.40	1.90	1.50	1.85	1.80	1.80
30	— .20	....	.30	1.65	2.30	1.75	2.40	1.65	1.60	1.80	1.80	1.85
31	— .20	....	.45	....	2.20	....	2.30	1.60	....	1.80	....	1.90

[a] Maximum gage height June 19, 4.7 feet.
[b] Maximum gage height July 22, 5.2 feet.

NOTE.—Gage heights affected by presence of ice Jan. 1 to 14 and Dec. 12 to 31; gage heights after May 14 read from a gage three-fourths mile downstream from the original gage. This gage is referred to a new datum.

PECOS RIVER AT SANTA ROSA, N. MEX.

Location.—At highway bridge at Santa Rosa, 1 mile above the mouth of Rio Agua Negra Chiquita and 6 miles above Canyon Pintada in sec. 11, T. 8 N., R. 21 E. From May 5, 1903, to December 31, 1906, a station was maintained near the present one by the United States Reclamation Service, but the gage heights were referred to a different datum.

Records available.—February 1, 1910, to July 31, 1911.

Drainage area.—2,780 square miles (measured from Land Office map).

Gage.—Chain gage.

Channel.—Very shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Practically no ice at this station.

Accuracy.—Owing to the shifting character of the stream the estimates can not be considered better than fair.

Cooperation.—Maintained in cooperation with the Territorial engineer.

Discharge measurements of Pecos River at Santa Rosa, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 12	C. B. Digby	0.60	12.0
Apr. 4	Russell and Waha	.44	7.2
May 18	G. H. Russell	1.79	314.

Daily gage height, in feet, of Pecos River at Santa Rosa, N. Mex., for 1911.

[W. C. Baker, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1....	0.65	0.56	0.66	0.56	1.34	2.40	1.45	16....	0.64	0.64	0.64	0.76	1.85	1.40	2.40
2....	.78	.54	.72	.60	1.50	2.90	1.40	17....	.64	.63	.62	.78	1.85	1.15	2.40
3....	.80	.54	.69	.58	1.46	2.00	2.50	18....	.68	.62	.54	.72	1.80	1.10	2.70
4....	.65	.54	.62	.61	1.38	1.75	2.25	19....	.62	.74	.56	.69	1.70	1.10	2.45
5....	.62	.56	.59	.54	1.19	1.70	2.10	20....	.66	.76	.64	.70	1.60	3.40	2.65
6....	.65	.49	.64	.76	1.26	1.80	2.25	21....	.64	.74	.56	.90	1.95	1.85	6.80
7....	.72	.54	.64	.84	1.60	1.70	2.35	22....	.65	.70	.62	.82	1.90	2.65	2.40
8....	.72	.54	.54	.76	1.56	1.65	3.15	23....	.65	.73	.68	.92	1.80	2.15	2.35
9....	.62	.52	.55	.82	1.71	1.55	2.05	24....	.62	.62	.69	.90	1.60	1.65	2.34
10....	.60	.54	.64	.83	1.75	1.70	3.20	25....	.65	.74	.65	1.40	1.40	1.65	2.09
11....	.70	.54	.55	.97	1.75	1.55	2.60	26....	.63	.66	.66	1.30	1.40	1.45	1.99
12....	.60	.56	.64	.90	2.15	1.55	2.55	27....	.66	.66	.60	1.12	1.35	1.45	2.69
13....	.62	.56	.59	.82	2.90	1.50	2.40	28....	.65	.69	.56	1.13	1.55	1.30	1.79
14....	.66	.52	.58	.83	3.50	1.40	2.25	29....	.65	......	.56	1.15	2.95	1.45	2.14
15....	.62	.58	.62	.69	2.55	1.40	2.10	30....	.58	......	.64	1.10	3.20	1.80	2.14
								31....	.59	......	.60	......	2.20	......	2.04

Daily discharge, in second-feet, of Pecos River at Santa Rosa, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1....	15	11	16	11	155	780	146	16....	14	14	14	25	352	127	780
2....	27	10	20	12	230	1,260	127	17....	14	14	13	27	352	57	780
3....	29	10	17	11	210	460	870	18....	17	13	10	20	320	46	1,060
4....	15	10	13	13	175	290	655	19....	13	22	11	17	260	46	825
5....	13	11	12	10	62	260	535	20....	16	25	14	18	210	1,840	1,010
6....	15	8.8	14	25	110	320	655	21....	14	22	11	46	422	352	6,060
7....	20	10	14	36	250	260	738	22....	15	18	13	32	385	1,010	780
8....	20	10	10	25	230	235	1,540	23....	15	21	17	51	320	575	738
9....	13	9.6	10	32	320	188	498	24....	13	13	17	46	210	235	729
10....	12	10	14	34	315	260	1,600	25....	15	22	15	200	127	235	528
11....	18	10	10	63	315	188	965	26....	14	16	16	155	127	146	452
12....	12	11	14	46	600	188	918	27....	16	16	12	95	111	146	1,050
13....	13	11	12	32	1,300	165	780	28....	15	17	11	97	188	95	314
14....	16	9.6	11	34	1,960	127	655	29....	15	......	11	105	1,320	146	567
15....	13	11	13	17	918	127	535	30....	11	......	14	75	1,600	320	567
								31....	12	......	12	......	615	......	490

NOTE.—Daily discharge Jan. 1 to Apr. 24 determined from a fairly well-defined rating curve; discharge Apr. 25 to May 13 computed by indirect method for shifting channels; discharge May 14 to July 31 determined from a poorly-defined rating curve.

Monthly discharge of Pecos River at Santa Rosa, N. Mex., for 1911.

[Drainage area, 2,780 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	29	11	15.5	0.0056	0.007	953	A.
February....................	25	8.8	13.8	.0050	.005	766	A.
March........................	20	10	13.3	.0048	.006	818	A.
April..........................	200	10	47.0	.017	.02	2,800	B.
May...........................	1,960	62	454	.163	.19	27,900	B.
June..........................	1,840	46	349	.126	.14	20,800	B.
July...........................	6,060	127	902	.324	.37	55,500	B.
The period..........	....	....	....	....	....	109,000	

PECOS RIVER NEAR DAYTON, N. MEX.

Location.—Three miles east of Dayton, in sec. 13, T. 18 S., R. 26 E.; 100 feet below the mouth of Penasco River.

Records available.—March 24, 1905, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff. The original gage was washed out September 6, 1905, and was relocated September 7, 1905, half a mile upstream. Datum unchanged since then.

Channel.—Shifting during high water.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice has little effect on the relation of gage height to discharge.

Diversions.—The station is about 10 miles above the dam at the outlet of Lake McMillan, one of the reservoirs in the United States Reclamation Service Carlsbad project, which will irrigate about 20,000 acres in the vicinity of Carlsbad.

Accuracy.—Owing to the shifting character of the stream, the estimates can not be considered better than fair.

Cooperation.—Station maintained in cooperation with the United States Reclamation Service, by which the field data are furnished.

Discharge measurements of Pecos River near Dayton, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Mar. 2	United States Reclamation Service engineers	3.50	266
11	.....do	3.00	163
Apr. 28	.....do	3.70	306
June 3	.....do	4.95	434
July 12	.....do	5.00	1,090
Nov. 1	.....do	3.30	406
Dec. 20	.....do	3.15	290

Daily gage height, in feet, of Pecos River near Dayton, N. Mex., for 1911.

[Hattie Cramer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	3.6	3.5	2.8	3.9	5.2	3.3	3.9	3.5	2.5	3.4	3.1
2	3.6	3.6	3.5	2.8	3.8	5.4	2.7	3.8	3.6	2.5	3.2	3.1
3	3.8	3.5	3.5	2.7	3.5	5.0	2.6	3.6	2.7	2.5	3.2	3.2
4	3.9	3.4	3.4	2.8	3.4	4.5	2.5	3.5	2.6	2.5	3.2	3.2
5	3.9	3.5	3.4	2.7	3.2	5.1	2.4	3.3	2.6	2.5	3.2	3.3
6	4.2	3.4	3.4	2.6	3.2	4.4	2.5	3.2	2.6	2.5	3.3	3.2
7	3.6	3.4	3.4	2.6	3.1	4.0	3.0	3.0	2.5	2.5	3.2	3.2
8	3.5	3.4	3.2	2.7	3.1	3.7	4.0	2.9	2.5	2.5	3.2	3.1
9	3.5	3.4	3.1	2.6	3.0	3.6	3.8	2.9	2.4	2.6	3.0	3.1
10	3.4	3.4	3.1	2.6	2.9	3.4	3.8	2.8	2.4	4.6	3.0	3.1
11	3.6	3.2	3.1	2.7	2.9	3.3	4.8	2.8	2.4	4.3	3.0	3.2
12	3.8	3.2	3.0	2.7	2.8	3.4	5.0	2.7	2.7	4.0	3.9	3.2
13	3.8	3.1	3.0	2.7	3.0	3.2	4.8	2.7	2.7	3.8	3.7	3.4
14	3.6	3.1	3.0	2.7	4.0	3.2	4.7	2.5	2.6	3.6	3.4	3.4
15	3.6	3.1	3.0	2.6	6.2	3.1	4.9	2.4	2.5	3.4	3.0	3.4
16	3.5	3.1	2.9	2.6	5.6	3.1	5.2	2.3	2.7	3.3	3.0	3.3
17	3.5	3.1	2.9	2.6	5.1	3.0	5.3	2.3	2.7	3.1	3.0	3.4
18	3.6	3.1	2.9	2.7	4.8	2.9	4.3	2.3	2.6	3.0	3.1	3.4
19	3.6	3.7	2.9	2.6	4.3	2.8	4.3	2.2	2.6	3.0	3.1	3.3
20	3.5	3.8	2.9	2.7	4.3	2.8	4.2	2.1	2.5	2.9	3.1	3.2
21	3.5	3.7	2.9	2.6	4.3	2.8	4.9	2.1	2.4	2.8	3.1	3.2
22	3.5	3.7	3.0	2.6	4.0	2.9	5.1	2.1	2.4	2.8	3.2	3.2
23	3.5	3.6	3.0	2.6	3.8	3.4	9.2	2.3	2.7	2.9	3.2	3.2
24	3.5	3.6	3.0	2.6	3.7	3.9	....	2.4	2.6	3.2	3.2	3.2
25	3.5	3.5	3.0	3.0	3.5	3.5	8.9	2.4	2.5	3.1	3.2	3.2
26	3.5	3.5	2.9	3.1	3.5	3.6	4.3	4.1	2.4	2.9	3.2	3.2
27	3.5	3.5	2.9	4.0	3.4	3.5	3.7	4.2	2.4	2.8	3.3	2.8
28	3.6	3.5	2.9	3.8	3.3	3.5	4.0	4.1	2.4	2.8	3.1	2.6
29	3.9	....	3.0	4.0	3.2	3.2	4.3	3.6	2.4	2.8	3.1	2.3
30	3.5	....	3.0	4.0	3.5	3.0	4.0	3.4	2.4	2.8	3.2	2.0
31	3.6	....	2.9	....	4.0	....	4.0	3.4	....	2.9	....	2.9

NOTE.—Gage heights affected by presence of ice Dec. 27 to 31; water surface over top of the gage July 24.

Daily discharge, in second-feet, of Pecos River near Dayton, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	300	300	270	132	414	680	135	750	510	170	463	284
2	300	300	270	132	372	740	75	679	561	170	320	284
3	372	270	270	120	270	500	65	561	210	170	320	320
4	414	244	244	132	244	280	65	510	188	170	320	320
5	414	270	244	120	198	555	55	418	188	170	320	358
6	570	244	244	110	198	245	65	376	188	170	358	320
7	300	244	244	110	178	155	110	300	170	170	320	320
8	270	244	198	120	178	120	380	266	170	170	320	284
9	270	244	178	110	160	110	300	266	154	188	250	284
10	244	244	178	110	145	95	300	236	154	1,370	250	284
11	300	198	178	120	145	80	895	236	154	1,090	250	320
12	372	198	160	120	132	100	1,050	210	210	830	680	320
13	372	178	160	120	160	80	950	210	210	679	545	398
14	300	178	160	120	460	80	870	170	188	561	398	398
15	300	178	160	110	2,470	75	1,040	154	170	463	250	398
16	270	178	145	110	1,730	75	1,300	139	210	418	250	358
17	270	178	145	110	1,130	75	1,400	139	210	337	250	398
18	300	178	145	120	880	65	585	139	188	300	284	398
19	300	334	145	110	480	60	585	125	188	300	284	358
20	270	372	145	120	480	60	525	112	170	266	284	320
21	270	334	145	110	430	65	1,040	112	154	236	284	320
22	270	334	160	110	310	75	1,210	112	154	236	320	320
23	270	300	160	110	230	125	8,440	139	210	266	320	320
24	270	300	160	110	205	200	11,000	154	188	376	320	320
25	270	270	160	160	155	150	7,900	154	170	337	320	320
26	270	270	145	178	155	170	1,090	915	154	266	320	320
27	270	270	145	460	125	150	617	1,000	154	236	358	200
28	300	270	145	372	120	150	830	915	154	236	284	180
29	414	....	160	460	105	110	1,090	561	154	236	284	160
30	270	....	160	460	130	100	830	463	154	236	320	150
31	300	....	145	....	190	....	830	463	....	266	....	200

NOTE.—Daily discharge determined from four poorly defined rating curves and by the use of the indirect method for shifting channels from May 15 to July 12; discharge July 24 estimated.

Monthly discharge of Pecos River near Dayton, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	570	244	312	19,200	A.
February	372	178	254	14,100	A.
March	270	145	180	11,100	A.
April	460	110	163	9,700	A.
May	2,470	105	406	25,000	C.
June	740	60	184	10,900	D.
July	[a] 11,000	55	1,470	90,400	C.
August	1,000	112	354	21,800	C.
September	561	154	201	12,000	C.
October	1,370	170	358	22,000	C.
November	680	250	328	19,500	C.
December	398	[a] 150	308	18,900	C.
The year	[a] 11,000	55	379	275,000	

[a] Maximum discharge occurred July 24, estimated 11,000 second-feet.

PECOS RIVER NEAR LAKEWOOD, N. MEX.

Location.—Three miles southeast of Lakewood, half a mile below the McMillan reservoir dam, in sec. 11, T. 20 S., R. 26 E.; no tributary between the station and the reservoir; Seven Rivers enters 3 miles below.

Records available.—January 11, 1906, to December 16, 1911.

Drainage area.—Not measured.

Gage.—Inclined staff gage. The original gage was at the lower side of the dam in the discharge gates, but was moved to a point near the lower end of the outlet canal February 8, 1906.

Discharge measurements.—Made from car and cable some distance below.

Winter flow.—Not affected by ice.

Diversions.—Lake McMillan is the upper reservoir in the Carlsbad project of the United States Reclamation Service. Although the flow from the lake passes the station, that over the flood spillways reaches the river below the station and is not recorded.

Cooperation.—Station maintained in cooperation with the United States Reclamation Service, by which the field data are furnished.

Daily gage height, in feet, of Pecos River near Lakewood, N. Mex., for 1911.

[H. C. Holcomb, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			1.5	1.4	0.80	1.0		6		1.2	1.2	0.9	1.2		0.55
2	2.5		.85	1.4	.8	1.15		17		2.4	1.2	1.05	1.2		
3	2.5		1.2	1.4	.8	1.3		18		2.4	1.0	1.05	1.15		
4	2.5		2.2	1.4	.8	1.3		19		2.4	.7	1.0	.95		
5	1.8		2.2	1.35	.8	1.3		20		1.6	.55	.95	.9		
6	.8		2.2	1.3	.8	1.3		21		.8	.55	.9	.9		
7	.5		2.15	1.3	.8	1.3		22		.65	.55	.8	.9		
8	.3		2.0	1.25	.8	1.3		23		.5	.6	.8	.9		
9			1.75	1.2	.8	1.3		24		4.45	.7	.8	.9		
10			1.6	1.15	.8	1.3		25		9.3	.9	.8	.9		
11			1.45	.95	1.9	1.3		26		9.9	1.2	.8	1.15		
12			1.3	.9	2.85	1.0		27		9.4	1.5	.8	1.3		
13			1.3	1.1	2.35	1.0	0.55	28		8.0	1.85	.8	1.3		
14			1.3	1.1	1.6	1.0	.9	29		5.5	2.2	.8	1.3		
15		0.7	1.25	.9	1.2	.6	.9	30		4.25	1.8	.8	1.15		
								31		2.85	1.4		1.0		

PECOS RIVER NEAR MOORHEAD, TEX.

Location.—At the high bridge of the Southern Pacific Railroad near Moorhead, Tex.

Records available.—April, 1900, to December 31, 1911.

Gage.—Rod bolted to one of the bridge piers; read with field glasses from the top of the cliff.

Channel.—A series of pools and rapids in a canyon about 300 feet deep; straight above and below the station; both banks are of rock and above flood level; the bottom of the pool at the station is of mud.

Discharge measurements.—Made from cable.

Cooperation.—Station established and operated by the United States section of the International Boundary Commission.

Discharge measurements of Pecos River near Moorhead, Tex., in 1911.

[By E. E. Winter and W. H. Dodd.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 4	0.45	224	Feb. 11	0.4	207
Jan. 9	.45	237	Feb. 16	.4	189
Jan. 13	.45	239	Feb. 19	5.4	3,683
Jan. 17	.45	230	Feb. 20	1.8	814
Jan. 21	.4	225	Feb. 23	1.0	453
Jan. 25	.55	279	Feb. 26	.9	424
Jan. 29	.5	263	Mar. 3	.7	297
Feb. 2	.45	214	Mar. 7	.7	286
Feb. 7	.45	218	Mar. 11	.7	277

Discharge measurements of Pecos River near Moorhead, Tex., in 1911—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 16	0.7	273	Aug. 8	2.35	1,295
Mar. 21	.6	265	Aug. 12	1.3	593
Mar. 25	.7	273	Aug. 16	1.3	594
Mar. 29	.7	274	Aug. 21	.95	371
Apr. 4	10.6	13,132	Aug. 25	.7	321
Apr. 7	1.3	596	Sept. 2	.6	264
Apr. 11	.9	428	Sept. 7	.6	272
Apr. 15	.7	368	Sept. 12	.5	246
Apr. 20	.7	321	Sept. 16	.4	221
Apr. 24	.7	309	Sept. 21	.4	225
Apr. 28	.9	365	Sept. 25	.5	233
May 4	1.0	505	Sept. 28	.4	230
May 9	.9	376	Oct. 3	.4	225
May 13	2.35	1,281	Oct. 7	.4	225
May 16	.9	362	Oct. 11	.6	259
May 19	.7	314	Oct. 16	.5	253
May 23	2.25	1,185	Oct. 19	.5	247
May 27	1.3	611	Oct. 24	.5	250
May 31	.9	377	Oct. 29	.5	248
June 3	.7	321	Nov. 4	.7	254
June 8	.6	286	Nov. 9	.9	259
June 13	.55	279	Nov. 13	.7	246
June 16	.55	270	Nov. 17	.7	236
June 24	4	240	Nov. 22	.65	237
June 28	.3	228	Nov. 29	.6	230
July 2	.3	193	Dec. 4	.6	224
July 8	.3	192	Dec. 8	.6	240
July 12	.3	190	Dec. 13	.9	357
July 17	.9	369	Dec. 17	.8	300
July 21	.85	350	Dec. 21	.8	304
July 25	.4	205	Dec. 26	.8	313
July 29	.3	189	Dec. 29	.85	335
Aug. 3	3.4	2,117			

Daily gage height, in feet, of Pecos River near Moorhead, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.4	0.4	0.7	0.7	2.4	0.9	0.3	2.35	0.6	0.4	0.5	0.6
2	.5	.45	.7	.75	2.25	.8	.3	2.9	.6	.4	.55	.6
3	.5	.45	.7	3.15	1.25	.7	.3	3.35	.55	.4	.55	.6
4	.45	.45	.7	9.3	1.05	.7	.3	3.55	.55	.4	.7	.6
5	.45	.45	.7	3.6	.95	.7	.3	3.75	.55	.4	.7	.6
6	.45	.45	.7	1.5	.9	.7	.3	3.95	.6	.4	.7	.6
7	.45	.45	.7	1.35	.9	.65	.3	3.7	.6	.4	.75	.6
8	.45	.45	.7	1.1	.9	.6	.3	2.35	.5	.55	.8	.6
9	.45	.4	.7	1.05	.9	.6	.3	1.9	.5	.8	.9	.6
10	.45	.4	.7	1.0	.9	.6	.3	1.65	.5	.7	.8	.6
11	.45	.4	.7	.9	.9	.6	.3	1.5	.5	.6	.8	.65
12	.45	.4	.7	.85	.85	.6	.3	1.35	.5	.55	.7	.85
13	.45	.45	.7	.7	1.9	.6	.3	1.2	.5	.5	.7	.9
14	.45	.5	.7	.7	1.75	.55	.3	1.2	.5	.5	.7	.8
15	.45	.4	.7	.7	.95	.55	.3	1.2	.5	.5	.7	.8
16	.45	.4	.7	.7	.9	.55	.9	1.3	.4	.5	.7	.8
17	.45	.4	.6	.7	.8	.55	.85	1.2	.4	.5	.7	.8
18	.45	2.95	.6	.7	.75	.5	.85	1.0	.4	.5	.7	.8
19	.45	5.25	.6	.7	.7	.5	.7	1.0	.4	.5	.7	.8
20	.4	1.65	.6	.7	.95	.45	.65	1.0	.4	.5	.7	.8
21	.4	1.35	.7	.7	.75	.4	.7	.95	.4	.5	.7	.8
22	.4	1.05	.7	.7	2.4	.4	.5	.9	.45	.5	.65	.8
23	.45	1.0	.7	.7	2.3	.4	.5	.8	.6	.5	.65	.8
24	.5	.85	.7	.7	1.7	.4	.5	.8	.5	.5	.6	.8
25	.55	.75	.7	.75	1.45	.4	.4	.7	.5	.5	.6	.8
26	.55	.7	.7	.85	1.3	.4	.4	.7	.4	.5	.6	.8
27	.5	.7	.7	.95	1.25	.35	.3	.7	.4	.5	.6	.8
28	.5	.8	.7	.9	1.15	.3	.3	.7	.4	.5	.6	.8
29	.5	......	.7	.9	1.1	.3	.3	.8	.4	.5	.6	.85
30	.5	......	.7	.9	.95	.3	.3	.75	.4	.5	.6	.8
31	.5	......	.7	....	.9	......	.8	.7	......	.5	......	.8

Daily discharge, in second-feet, of Pecos River near Moorhead, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	220	200	340	275	1,310	375	200	1,400	270	230	250	230
2	240	a 215	315	290	1,220	350	a 195	1,780	a 265	225	250	230
3	230	215	a 295	2,040	645	a 320	195	a 2,090	260	a 225	250	225
4	a 225	215	290	a 10,770	a 535	320	190	2,230	260	225	a 255	a 225
5	225	215	290	2,330	460	320	190	2,390	260	225	255	230
6	230	220	285	750	420	320	190	2,550	270	225	255	230
7	230	a 220	a 285	a 635	405	305	190	2,350	a 270	a 225	255	235
8	235	220	285	510	390	a 285	a 190	a 1,290	255	260	255	a 240
9	a 235	205	280	490	a 375	285	190	1,010	255	325	a 260	250
10	235	205	280	470	375	285	190	840	250	290	255	260
11	240	a 205	a 275	a 430	375	285	190	730	250	a 260	255	255
12	240	205	275	415	345	285	a 190	a 625	a 245	255	245	335
13	a 240	210	275	370	a 1,000	a 285	190	545	245	255	a 245	a 355
14	235	215	275	370	905	280	190	545	240	255	245	325
15	235	195	275	a 370	396	275	190	545	240	255	240	315
16	230	a 190	a 275	360	a 360	a 270	370	595	a 220	a 255	235	310
17	a 230	190	265	350	340	270	a 350	535	220	250	a 235	a 300
18	230	1,720	265	340	325	260	350	425	225	250	235	300
19	230	a 3,560	265	330	a 315	260	290	415	225	a 245	240	300
20	225	a 745	265	a 320	455	250	270	405	225	250	240	305
21	a 225	610	a 275	320	340	240	a 300	a 370	a 225	250	240	a 305
22	225	475	275	315	1,270	240	240	360	230	250	a 235	305
23	245	a 455	275	310	a 1,210	240	240	340	250	250	235	310
24	260	410	275	a 310	855	a 240	240	340	235	a 250	230	310
25	a 280	380	a 275	325	705	240	a 205	a 320	a 235	250	230	310
26	280	365	275	350	610	240	205	315	230	250	230	a 315
27	265	365	275	380	a 580	235	190	310	230	250	230	315
28	265	a 395	275	a 365	520	a 230	190	305	a 230	250	230	330
29	a 265	....	a 275	365	490	220	190	320	230	a 250	a 230	a 335
30	255	....	275	365	400	210	190	305	230	250	230	325
31	245	....	275	....	a 375	....	330	290	....	250	....	325

a Date of measurement.

Monthly discharge of Pecos River near Moorhead, Tex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	280	220	240	14,777
February	3,560	190	465	25,825
March	340	265	280	17,217
April	10,770	275	854	50,817
May	1,310	315	590	36,307
June	375	210	274	16,304
July	370	190	226	13,924
August	2,550	290	867	53,296
September	270	220	243	14,430
October	325	225	250	15,342
November	260	230	242	14,430
December	355	225	289	17,772
The year	10,770	190	401	290,441

GALLINAS RIVER NEAR LAS VEGAS, N. MEX.

Location.—At Las Vegas Hot Springs, 6 miles northwest of Las Vegas near sec. 1, T. 16 N., R. 15 E. No tributaries between the station and Las Vegas nor for several miles above.

Records available.—August 13, 1903, to December 31, 1911.

Drainage area.—89 square miles (measured on topographic sheets).

Gage.—Vertical staff 600 feet above the power house footbridge, installed to replace the original gage, which was washed out September 29, 1904; datum of new gage, 0.71 foot lower than that of the original gage.

Channel.—Somewhat shifting during high water.

Discharge measurements.—Made from the footbridge during high water and by wading at ordinary stages.

Winter flow.—Gage heights unaffected by ice, as channel is kept open by the hot springs.

Diversions.—A short distance above the station is a timber dam which forms a pond from which ice is cut, but this dam does not control the flow in any way. A small amount of water is diverted at this point by the Aqua Pura Co., which furnishes Las Vegas and the Atchison, Topeka & Santa Fe Railway with water. A mile below the station is a dam which diverts the flood flow of the Gallinas to the San Guyjilla basin. The fall of the river is so heavy that the gaging station is above the influence of this dam.

Accuracy.—Although the river is somewhat shifting at this station, it is believed that the estimates of discharge may be considered fair.

Cooperation.—Maintained in cooperation with the Territorial engineer.

Discharge measurements of Gallinas River near Las Vegas, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 10	H. B. Waha	2.29	42.0
June 14	G. H. Russell	1.82	3.7
July 27	.....do	2.38	55.7
28	.....do	2.58	11.0

Daily gage height, in feet, of Gallinas River near Las Vegas, N. Mex., for 1911.

[William Prager, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.6	1.6	1.7	2.05	2.2	2.2	2.0	2.35	1.9	1.7	2.1	1.9
2	1.6	1.6	1.7	2.05	2.1	2.1	1.95	2.3	1.9	1.7	2.1	1.9
3	1.65	1.6	1.7	2.0	2.1	2.05	2.3	2.2	1.8	1.7	2.1	1.9
4	1.7	1.6	1.7	2.0	2.1	2.0	2.25	2.15	1.9	1.8	2.1	1.9
5	1.7	1.6	1.9	2.1	2.1	2.0	2.26	2.1	1.8	2.95	2.1	1.9
6	1.65	1.65	1.8	2.1	2.1	2.0	2.72	2.1	1.8	2.95	2.1	1.9
7	1.6	1.7	1.8	2.0	2.2	2.0	2.2	2.05	1.8	2.6	2.1	1.9
8	1.6	1.7	1.95	2.05	2.3	1.95	2.25	2.0	1.8	2.3	2.1	1.9
9	1.6	1.65	2.25	2.1	2.3	1.9	2.52	2.0	1.8	2.05	2.1	1.9
10	1.6	1.6	2.2	2.0	2.3	1.9	3.13	1.9	1.8	2.3	2.1	1.9
11	1.6	1.65	1.9	2.0	2.3	1.9	2.35	1.9	1.8	2.2	2.1	1.9
12	1.6	1.7	2.0	2.0	2.25	1.9	2.2	1.9	1.8	2.0	2.0	1.9
13	1.6	1.6	2.05	2.0	2.2	1.9	2.2	1.8	1.8	1.9	2.0	1.9
14	1.6	1.7	1.9	2.0	2.2	1.9	2.4	1.8	1.7	1.8	2.0	1.9
15	1.6	1.7	1.95	2.0	2.43	1.9	2.4	1.8	1.7	1.7	2.0	1.8
16	1.6	1.7	2.05	2.0	2.4	1.85	2.4	1.8	1.7	1.85	2.0	1.8
17	1.6	1.7	2.05	2.0	2.3	1.8	2.4	1.9	1.7	1.9	2.0	1.8
18	1.6	1.7	1.9	2.0	2.2	1.8	2.4	1.95	1.7	1.9	2.0	1.8
19	1.6	1.7	1.9	2.0	2.2	1.8	2.35	1.9	1.7	1.9	2.0	1.8
20	1.6	1.7	1.95	2.0	2.2	1.8	2.95	1.9	1.6	1.9	2.0	1.8
21	1.6	1.7	1.9	2.0	2.2	1.8	2.75	1.9	1.6	1.9	2.0	1.7
22	1.6	1.7	1.9	2.05	2.15	1.8	2.45	2.0	1.6	1.85	2.0	1.7
23	1.6	1.7	1.9	2.1	2.1	1.8	3.1	2.0	1.6	1.8	2.0	1.7
24	1.6	1.7	1.9	2.15	2.1	1.8	2.5	2.0	1.6	1.8	2.0	1.7
25	1.6	1.7	1.9	2.1	2.05	1.8	2.45	1.95	1.6	1.8	2.0	1.7
26	1.6	1.7	1.9	2.1	2.0	1.8	2.35	1.9	1.6	1.8	2.0	1.7
27	1.6	1.7	1.9	2.1	2.0	2.03	2.4	1.9	1.7	1.9	2.0	1.7
28	1.6	1.7	2.0	2.1	2.05	1.85	2.78	2.44	1.7	2.05	2.0	1.7
29	1.6	.....	2.05	2.2	2.63	1.85	2.6	2.05	1.7	2.1	1.9	1.7
30	1.6	....	2.0	2.2	2.15	1.8	2.5	2.0	1.7	2.2	1.8	1.7
31	1.6	....	2.0	....	2.15	....	2.45	1.9	....	2.2	....	1.7

Daily discharge, in second-feet, of Gallinas River near Las Vegas, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.3	0.3	1.8	20	31	30	12	52	7	1	19	7
2	.3	.3	1.8	20	21	19	9.5	43	7	1	19	7
3	1.0	.3	1.8	15	21	16	43	30	3	1	19	7
4	1.8	.3	1.8	15	21	12	36	24	7	3	19	7
5	1.8	.3	10.5	25	21	12	38	19	3	260	19	7
6	1.0	1.0	5.0	25	21	12	158	19	3	260	19	7
7	.3	1.8	5.0	15	31	12	30	16	3	116	19	7
8	.3	1.8	15	18	44	9.5	36	12	3	43	19	7
9	.3	1.0	44	23	44	7	92	12	3	16	19	7
10	.3	.3	37	14	43	7	358	7	3	43	19	7
11	.3	1.0	9	14	43	7	52	7	3	30	19	7
12	.3	1.8	17	14	36	7	30	7	3	12	12	7
13	.3	.3	22	14	30	7	30	3	3	7	12	7
14	.3	1.8	9	14	30	7	61	3	1	3	12	7
15	.3	1.8	13	14	68	7	61	3	1	1	12	3
16	.3	1.8	22	14	61	5	61	3	1	5	12	3
17	.3	1.8	22	14	43	3	61	7	1	7	12	3
18	.3	1.8	9	14	30	3	61	9.5	1	7	12	3
19	.3	1.8	9	14	30	3	52	7	1	7	12	3
20	.3	1.8	13	14	30	3	260	7	.5	7	12	3
21	.3	1.8	9	14	30	3	170	7	.5	7	12	1
22	.3	1.8	9	18	24	3	74	12	.5	5	12	1
23	.3	1.8	9	23	19	3	340	12	.5	3	12	1
24	.3	1.8	8	26	19	3	86	12	.5	3	12	1
25	.3	1.8	8	21	16	3	74	9.5	.5	3	12	1
26	.3	1.8	8	21	12	3	52	7	.5	3	12	1
27	.3	1.8	8	21	12	14	61	7	1	7	12	1
28	.3	1.8	15	21	16	5	182	71	1	16	12	1
29	.3	....	20	31	126	5	116	16	1	19	7	1
30	.3	....	15	31	24	3	86	12	1	30	3	1
31	.3	....	15	....	24	....	74	7	....	30	....	1

NOTE.—Discharge determined from two fairly well defined rating curves applicable Jan. 1 to Mar. 8 and May 10 to Dec. 31. Discharge Mar. 9 to May 9 determined by the indirect method for shifting channels.

Monthly discharge of Gallinas River near Las Vegas, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1.8	0.3	0.44	27	D.
February	1.8	.3	1.34	74.4	D.
March	44	1.8	12.7	781	D.
April	31	14	18.6	1,110	D.
May	126	12	32.9	2,020	B.
June	30	3	7.78	463	C.
July	358	9.5	92.1	5,660	B.
August	71	3	14.9	916	C.
September	7	.5	2.15	128	D.
October	260	1	30.8	1,890	C.
November	19	3	14.1	839	C.
December	7	1	4.1	252	D.
The year	358	.3	19.6	14,200	

SOUTH FORK OF GALLINAS RIVER NEAR EL PORVENIR, N. MEX.

Location.—At the Gallinas planting station of the United States Forest Service, in the Pecos National Forest, in sec. 14, T. 17 N., R. 14 E., 3 miles southeast of El Porvenir post office; 10 miles above the junction of the North and South forks. Nearest tributary is a small stream entering from the north a short distance above.

Records available.—May 9, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—Ice present at this station during the winter months.

Diversions.—No diversions above except an intermittent one of less than 0.5 second-foot. Just below the station the Forest Service has a ditch of 3 second-feet capacity.

Accuracy.—Owing to a lack of discharge measurements no estimates of flow are available at the present time.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. B. Waha:

May 9, 1911: Gage height, 1.98 feet; discharge, 20 second-feet.

Daily gage height, in feet, of South Fork of Gallinas River near El Porvenir, N. Mex., for 1911.

[H. D. Burrall, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	1.63	1.50	1.87	1.30	1.28	....	1.66
2	....	1.56	1.90	1.88	1.28	1.24	1.78	1.63
3	....	1.54	2.05	1.77	1.30	1.23	1.67	1.66
4	....	1.47	1.85	1.68	1.35	1.67	1.66	1.62
5	....	1.46	1.80	1.61	1.28	4.24	1.70	1.59
6	....	1.41	1.78	1.58	1.24	4.22	1.70	1.59
7	....	1.40	1.75	1.53	1.23	3.16	1.67	1.58
8	....	1.38	1.67	1.53	1.23	2.37	1.68	....
9	1.98	1.38	1.84	1.47	1.24	1.98	1.70	1.53
10	2.00	1.34	1.96	1.44	1.26	1.90	1.68	1.54
11	1.87	1.31	2.24	1.41	1.25	1.86	1.70	1.48
12	1.84	1.31	2.04	1.40	1.24	1.78	1.72	1.48
13	1.86	1.30	1.98	1.39	1.24	1.73	1.77	1.56
14	2.04	1.30	2.00	1.38	1.21	1.70	1.67	1.64
15	2.08	1.30	....	....	1.20	1.74	1.68	1.63
16	2.00	1.30	....	....	1.20	1.67	1.68	1.70
17	1.94	1.30	2.39	1.49	1.20	1.57	1.68	1.70
18	1.87	1.25	2.33	1.44	1.18	1.54	1.78	....
19	1.79	1.25	2.15	1.46	1.20	1.52	1.62	....
20	1.85	1.28	2.10	1.38	1.24	1.50	1.60	1.69
21	1.76	1.28	2.55	1.38	1.21	1.50	1.62	1.62
22	1.68	1.30	2.15	1.40	1.21	1.54	1.62	1.49
23	1.64	1.28	2.01	1.56	1.19	1.51	1.60	1.44
24	1.54	1.20	2.29	1.42	1.18	1.48	1.45	1.43
25	1.58	1.16	2.19	1.38	1.16	1.49	1.80	1.40
26	1.56	1.15	2.24	1.35	1.20	1.47	1.64	1.40
27	1.53	1.17	2.23	1.35	1.20	1.59	1.61	1.39
28	1.52	1.19	2.20	1.40	1.20	1.65	1.30	1.38
29	1.52	1.15	2.12	1.40	1.26	....	1.58	1.36
30	1.50	1.20	1.98	1.38	1.39	....	1.66	1.36
31	1.58	....	1.96	1.35	....	....	....	1.40

NOTE.—Gage heights affected by presence of ice Nov. 18, Nov. 24 to Dec. 31.

RIO RUIDOSO NEAR GLENCOE, N. MEX.

Location.—At the forest ranger station in the Lincoln National Forest, in sec. 33, T. 10 S., R. 15 E., about 2 miles above Glencoe post office; 1½ miles above the mouth of Perry Canyon and 2½ miles above the mouth of Eagle Creek.

Records available.—August 17, 1910, to November 6, 1911.

Drainage area.—Not measured.

Gage.—Inclined staff.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading.

Winter flow.—Ice exists at this station during the winter months.

Diversions.—Numerous small ditches divert water for irrigation for a distance of 16 miles above the station.

Accuracy.—Owing to lack of discharge measurements, no estimates of discharge can be made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following measurement was made by H. B. Waha:

June 1, 1911: Gage height, 1.75 feet; discharge, 22.2 second-feet.

Daily gage height, in feet, of Rio Ruidoso near Glencoe, N. Mex., for 1911.

[R. L. Bateman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			1.50	2.15	2.18	1.90	2.50	1.82		1.65	
2		1.45	1.54	2.05	2.08	1.82	2.37	1.72	1.60	1.65	1.60
3	2.20		1.56	2.02		1.68	2.15	1.70		1.65	
4	2.10		1.55	2.00		1.62	2.00	1.65	1.60	1.65	1.60
5		1.40	1.60	1.90		1.60	2.05	1.60	1.60	1.80	1.60
6		1.35	1.68	1.78		1.68	2.05	1.52	1.60	2.50	1.60
7		1.25	1.68	1.70		1.62	2.08	1.50		2.40	
8	1.50	1.25				1.62		1.47		2.40	
9	1.50	1.24				1.65		1.45		2.15	
10		1.22	1.76	1.90		1.72		1.45		1.95	
11		1.21	1.80	1.90			2.20	1.40		1.90	
12		1.21	1.86	1.80		1.68	2.30	1.35		1.85	
13			1.82	1.80		1.60	2.30			1.85	
14		1.22		1.90		1.52	2.35	1.35		1.85	
15		1.22		1.80		1.50	2.45	1.34			
16			1.70	1.80	2.25	1.48	2.25	1.30		1.75	
17		2.30	1.70	1.80	1.95	1.72	2.45	1.30		1.75	
18			1.73		1.95		2.57		1.65		
19	1.50		1.76		1.95	1.62	2.50	1.10	1.65	1.65	
20	1.50		1.79	1.80	1.82	1.55	2.45	1.05		1.65	
21	1.50		1.79	1.80	1.82	1.50		1.08		1.60	
22	1.50			1.80	1.72	1.55		1.05		1.60	
23	1.50	1.32	1.80	1.80	1.78	1.62		1.05	1.65	1.60	
24	1.50	1.41	1.80		1.68	1.90	2.50	1.10	1.60	1.60	
25	1.50	1.46	1.85		1.62	1.70		1.15	1.60	1.60	
26	1.50	1.41	1.88	2.10	1.62	1.58		1.50	1.60	1.60	
27	1.50	1.42		2.10	1.60	1.80	2.40	1.60	1.62	1.60	
28	1.50	1.51		2.10	1.55	1.70	2.15	1.65	1.58	1.60	
29	1.45			2.15	2.60	1.65	2.00	1.60		1.75	
30	1.45			2.30	1.75		1.90	1.60	1.65		
31	1.45		2.15		1.88		1.88				

NOTE.—Gage heights affected by presence of ice Jan. 3 to Feb. 6.

RIO RUIDOSO NEAR RUIDOSO, N. MEX.

Location.—At Wingfield's ranch, in sec. 21, T. 11 S., R. 13 E., in the Lincoln National Forest, about 3 miles northwest of Ruidoso, 1 mile above the mouth of Carrizo Creek. A small stream enters from the north just above the station.

Records available.—May 30, 1911, to July 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading.

Accuracy.—Owing to the meagerness of the data no estimates of flow can be made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. B. Waha:
May 30, 1911: Gage height, 1.24 feet; discharge, 10.4 second-feet.

Daily gage height, in feet, of Rio Ruidoso near Ruidoso, N. Mex., for 1911.

[I. N. Wingfield, observer.]

Day.	May.	June.	July.	Day.	May.	June.	July.	Day.	May.	June.	July.
1		1.22	1.00	11		1.04	1.33	21		1.23	1.58
2		1.22	1.64	12		1.12	1.44	22		1.16	1.53
3		1.18	1.54	13		1.13	1.62	23		1.11	1.49
4		1.14	1.50	14		1.12	1.80	24		1.10	1.48
5		1.13	1.45	15		1.12	1.49	25		1.08	1.42
6		1.13	1.54	16		1.08	1.43	26		1.07	1.38
7		1.12	1.68	17		1.05	1.62	27		1.04	1.30
8		1.12	1.55	18		1.02	1.72	28		1.03	1.24
9		1.12	1.51	19		1.00	1.72	29		1.04	1.23
10		1.07	1.38	20		1.32	1.66	30	1.23	1.01	1.21
								31	1.24		1.20

PENASCO RIVER AT ELK, N. MEX.

Location.—At Elk post office, in sec. 5, T. 16 S., R. 16 E. Nearest tributary, Burned Canyon, which enters a short distance above. Elk Canyon enters 1½ miles below.

Records available.—Fragmentary records from August 15, 1910, to September 30, 1911.

Drainage area.—Not measured.

Gage.—Chain gage established November 25, 1910, replacing a staff gage established August 15, 1910, and destroyed by flood September 1. Chain gage datum differs from that of the staff gage.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—No data.

Diversions.—Many small irrigation ditches divert water for 30 miles above the station.

Accuracy.—Owing to the lack of discharge measurements no estimates of flow can be made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Penasco River at Elk, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 16	Digby and Benson	1.98	19.4
May 27	H. B. Waha	1.73	5.5

Daily gage height, in feet, of Penasco River at Elk, N. Mex., for 1911.

[A. N. Bailey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1								1.9	1.5
2						1.8	1.9		
3			1.9		1.8		1.95		1.55
4				1.9	1.8	1.75			1.6
5				1.9	1.8	1.82			1.5
6						1.78		1.8	1.5
7				1.9	1.8				1.45
8			1.9	1.9	1.8	1.7			
9					1.8	1.65	2.0		2.45
10					1.8		2.05	1.75	
11			1.8			1.7	2.0	1.7	2.0
12				1.8		1.8		1.7	1.75
13							1.95	1.7	1.75
14						1.9	2.0		
15	1.9		1.8		1.9	1.9		1.65	1.7
16	1.85			1.8		1.85	1.95		
17							1.95	1.5	1.7
18				1.8	1.9	1.88	1.95		1.75
19			1.8	1.8	1.8				1.65
20			1.8					1.45	
21									1.8
22			1.8						
23				1.9			1.9	1.45	
24				1.9					
25						1.7			1.9
26			1.8			1.7	1.9	1.5	1.9
27					1.73	1.65		1.5	
28					1.7	1.6	1.95		
29							2.0		1.85
30				1.9	1.78	1.7	2.15		1.8
31			1.8					1.45	

PENASCO RIVER AT CLEVE'S RANCH, NEAR ELK, N. MEX.

Location.—At Cleve's ranch, about sec. 12, T. 16 S., R. 17 E., and 4 miles below Elk post office; below the springs which give rise to the Lower Penasco.

Records available.—January 17, 1911, to March 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too few to determine.

Discharge measurements.—Made from foot bridge.

Diversions.—No water is diverted from the Lower Penasco above this station.

Accuracy.—Owing to the lack of discharge measurements, no estimates of discharge can be made.

Cooperation.—Gage heights furnished by Mr. Walter Coleman.

The following discharge measurement was made by Digby and Benson:

January 17, 1911: Gage height, 2.35 feet; discharge, 59 second-feet.

Daily gage height, in feet, of Penasco River near Elk, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1		2.4	2.4	11		2.3	2.4	21	2.4	2.2	2.2
2		2.4	2.3	12		2.3	2.4	22	2.4	2.2	2.3
3		2.3	2.3	13		2.3	2.3	23	2.4	2.3	2.3
4		2.3	2.3	14		2.3	2.3	24	2.5	2.4	2.3
5		2.3	2.4	15		2.2	2.3	25	2.35	2.5	2.3
6		2.3	2.4	16		2.2	2.25	26	2.2	2.3	2.4
7		2.3	2.4	17	2.4	2.3	2.2	27		2.4	2.4
8		2.2	2.2	18	2.4	2.4	2.2	28	2.3	2.4	2.4
9		2.2	2.2	19	2.4	2.5	2.2	29	2.3		2.4
10		2.2	2.2	20	2.4	2.2	2.2	30	2.4		2.4
								31	2.4		2.3

DEVILS RIVER BASIN.

DEVILS RIVER AT DEVILS RIVER, TEX.

Location.—Opposite the Southern Pacific Railroad station at Devils River, Tex.

Records available.—April, 1900, to December 31, 1911.

Gage.—A vertical rod spiked to a tree.

Channel.—The channel is rocky and permanent but rough, with fissures and faults, resulting in shifting currents. Right bank is the talus of a cliff and the left bank is a bottom heavily wooded.

Discharge measurements.—Made from cable.

Cooperation.—Station established and operated by the United States section of the International Boundary Commission.

Discharge measurements of Devils River at Devils River, Tex., in 1911.

[By E. E. Winter and W. H. Dodd.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 5	2.15	376	July 9	2.2	366
Jan. 10	2.15	387	July 13	2.15	374
Jan. 18	2.2	391	July 18	2.15	362
Jan. 22	2.15	382	July 22	2.2	383
Jan. 30	2.15	379	July 30	2.15	361
Feb. 3	2.15	381	Aug. 4	2.15	363
Feb. 8	2.1	336	Aug. 9	2.1	319
Feb. 13	2.15	384	Aug. 17	2.1	318
Feb. 18	2.6	729	Aug. 22	2.1	323
Feb. 27	2.3	508	Aug. 30	2.1	305
Mar. 8	2.3	473	Sept. 4	2.1	311
Mar. 13	2.3	482	Sept. 14	2.1	297
Mar. 22	2.3	482	Sept. 22	2.1	307
Mar. 26	2.3	492	Sept. 26	2.1	305
Mar. 30	2.3	500	Sept. 30	2.1	308
Apr. 5	2.6	702	Oct. 8	2.15	325
Apr. 12	2.4	577	Oct. 12	2.15	333
Apr. 17	2.5	643	Oct. 20	2.15	331
Apr. 27	2.4	581	Oct. 25	2.15	329
Apr. 30	2.35	540	Oct. 31	2.2	369
May 5	2.3	453	Nov. 5	2.2	351
May 14	2.3	461	Nov. 14	2.2	358
May 20	2.25	449	Nov. 19	2.2	367
May 24	2.2	391	Nov. 27	2.2	370
May 30	2.2	395	Nov. 30	2.2	361
June 5	2.2	393	Dec. 10	2.2	424
June 9	2.2	396	Dec. 14	2.2	422
June 17	2.15	386	Dec. 22	2.25	462
June 25	2.15	374	Dec. 27	2.2	420
June 30	2.15	383	Dec. 30	2.25	437

Daily gage height, in feet, of Devils River at Devils River, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.15	2.15	2.25	2.25	2.3	2.2	2.15	2.2	2.15	2.1	2.2	2.2
2	2.15	2.15	2.25	4.45	2.35	2.2	2.2	2.2	2.15	2.1	2.25	2.2
3	2.15	2.15	2.25	2.9	2.35	2.2	2.2	2.15	2.1	2.1	2.25	2.2
4	2.15	2.15	2.25	2.85	2.3	2.2	2.2	2.15	2.1	2.1	2.2	2.2
5	2.15	2.15	2.3	2.65	2.3	2.2	2.2	2.15	2.1	2.1	2.2	2.2
6	2.15	2.1	2.3	2.6	2.3	2.2	2.2	2.15	2.1	2.1	2.2	2.2
7	2.15	2.1	2.3	2.5	2.3	2.2	2.2	2.15	2.1	2.1	2.4	2.2
8	2.15	2.1	2.3	2.45	2.3	2.2	2.2	2.1	2.1	2.15	2.35	2.2
9	2.15	2.1	2.3	2.4	2.3	2.2	2.2	2.1	2.1	2.15	2.2	2.25
10	2.15	2.15	2.3	2.4	2.3	2.2	2.2	2.1	2.1	2.15	2.2	2.2
11	2.15	2.15	2.3	2.4	2.35	2.2	2.15	2.15	2.1	2.15	2.2	2.2
12	2.15	2.15	2.3	2.4	2.35	2.2	2.15	2.15	2.1	2.15	2.2	2.2
13	2.15	2.15	2.3	2.4	2.35	2.2	2.15	2.1	2.1	2.15	2.2	2.2
14	2.15	2.15	2.3	2.35	2.3	2.2	2.15	2.15	2.1	2.15	2.2	2.2
15	2.15	2.2	2.3	2.35	2.3	2.15	2.2	2.15	2.1	2.2	2.2	2.2
16	2.15	2.2	2.3	2.8	2.25	2.15	2.2	2.15	2.1	2.15	2.2	2.2
17	2.15	2.4	2.3	2.55	2.25	2.15	2.2	2.1	2.1	2.15	2.2	2.2
18	2.2	2.6	2.3	2.35	2.25	2.15	2.15	2.1	2.1	2.15	2.2	2.2
19	2.2	2.5	2.65	2.3	2.25	2.15	2.15	2.1	2.1	2.15	2.2	2.3
0	2.15	2.35	2.35	2.3	2.25	2.15	2.15	2.1	2.1	2.15	2.2	2.25

Daily gage height, in feet, of Devils River at Devils River, Tex., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	2.15	2.3	2.3	2.4	2.25	2.15	2.2	2.1	2.1	2.15	2.2	2.25
22	2.15	2.3	2.3	2.4	2.25	2.15	2.2	2.1	2.1	2.15	2.2	2.25
23	2.15	2.3	2.3	2.4	2.25	2.15	2.2	2.1	2.1	2.15	2.2	2.25
24	2.15	2.3	2.3	2.35	2.2	2.15	2.3	2.1	2.1	2.15	2.2	2.25
25	2.15	2.3	2.3	2.4	2.2	2.15	2.3	2.1	2.1	2.15	2.2	2.25
26	2.15	2.3	2.3	2.4	2.2	2.15	2.2	2.1	2.1	2.15	2.2	2.2
27	2.15	2.3	2.3	2.4	2.2	2.15	2.2	2.1	2.1	2.15	2.2	2.2
28	2.15	2.3	2.3	2.4	2.2	2.15	2.2	2.1	2.1	2.2	2.2	2.2
29	2.15	....	2.3	2.35	2.2	2.15	2.15	2.1	2.1	2.2	2.2	2.25
30	2.15	....	2.3	2.35	2.2	2.15	2.15	2.1	2.1	2.2	2.2	2.25
31	2.15	....	2.3	....	2.2	....	2.15	2.1	....	2.2	....	2.25

Daily discharge, in second-feet, of Devils River at Devils River, Tex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	375	380	470	470	500	395	380	380	325	310	365	365
2	375	380	460	3,370	520	395	400	380	325	310	390	375
3	375	[a] 380	455	1,130	505	395	395	370	310	310	390	390
4	375	380	455	1,060	465	395	390	[a] 365	[a] 310	310	355	385
5	[a] 375	375	495	[a] 770	[a] 455	[a] 395	385	360	310	310	[a] 350	390
6	380	340	490	700	455	395	380	355	310	310	350	395
7	380	340	480	640	455	395	375	350	310	310	475	405
8	380	[a] 335	[a] 475	610	455	395	370	325	305	[a] 325	445	410
9	385	335	475	580	455	[a] 395	[a] 365	[a] 320	305	325	355	440
10	[a] 385	370	475	580	460	395	370	320	305	330	355	[a] 425
11	385	375	480	575	490	395	350	340	305	330	355	425
12	385	380	480	[a] 575	490	395	360	340	300	[a] 335	360	420
13	385	[a] 385	[a] 480	575	490	395	[a] 375	320	300	335	360	420
14	380	385	480	545	[a] 460	395	370	340	[a] 295	335	[a] 360	[a] 420
15	380	420	480	545	465	385	390	340	300	355	360	425
16	380	420	480	980	440	385	380	340	300	335	360	425
17	380	575	480	[a] 700	440	[a] 385	380	[a] 320	300	335	365	430
18	[a] 390	[a] 730	480	550	445	385	[a] 360	320	300	330	365	430
19	390	660	725	520	445	385	360	320	300	330	[a] 365	480
20	380	555	515	520	[a] 450	380	360	320	305	[a] 330	365	460
21	380	520	480	580	440	380	380	320	305	330	365	460
22	[a] 380	520	[a] 480	580	435	380	[a] 380	[a] 325	[a] 305	330	365	[a] 460
23	380	515	485	580	425	375	380	320	305	330	365	460
24	380	515	485	550	[a] 390	375	420	320	305	330	370	455
25	380	515	490	580	390	[a] 375	420	315	305	[a] 330	370	455
26	380	510	[a] 490	580	390	375	380	315	[a] 305	330	370	425
27	380	[a] 510	495	[a] 580	395	375	380	315	305	335	[a] 370	[a] 420
28	380	510	495	570	395	380	380	310	305	360	365	420
29	380	....	500	540	395	380	360	310	310	360	365	435
30	[a] 380	....	[a] 500	[a] 540	[a] 395	[a] 385	[a] 360	[a] 305	[a] 310	365	[a] 360	[a] 435
31	380	....	500	....	395	....	360	305	....	[a] 370	....	435

[a] Date of measurement.

Monthly discharge of Devils River at Devils River, Tex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	390	375	381	23,405
February	730	335	451	25,023
March	725	455	491	30,169
April	3,370	470	722	42,992
May	520	390	445	27,342
June	395	375	387	23,033
July	420	350	377	23,197
August	380	305	332	20,400
September	325	295	306	18,208
October	370	310	331	20,370
November	475	350	370	22,036
December	480	365	425	26,112
The year	3,370	295	417	302,291

RIO SALADO BASIN.

RIO SALADO NEAR GUERRERO, TAMAULIPAS, MEXICO.

Location.—2 miles above Guerrero and 6 miles above the confluence of the Rio Salado and the Rio Grande.

Records available.—December 27, 1900, to December 31, 1911, except March and April, 1903.

Gage.—An inclined rod fastened to posts sunk in the bank.

Channel.—A series of pools and rapids between permanent banks of sandy clay. The station is at a pool with a mud bed. Channel curves to the left both above and below the station.

Discharge measurements.—Made from cable at high stages and by wading at low stages.

Cooperation.—Station established and operated by the Mexican section of the International Boundary Commission.

Discharge measurements of Rio Salado near Guerrero, Tamaulipas, Mexico, in 1911.

[By M. G. Garcia.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 3	2.7	494	July 15	0.2	[a] 43
Jan. 7	2.7	491	July 19	.1	[a] 29
Jan. 11	2.7	487	July 23	.0	[a] 21
Jan. 15	2.6	454	July 26	2.7	473
Jan. 19	2.6	454	July 28	4.3	1,131
Jan. 23	2.4	[a] 276	Aug. 3	1.7	[a] 179
Jan. 28	2.3	[a] 251	Aug. 7	1.0	[a] 110
Feb. 3	2.2	[a] 235	Aug. 11	.8	[a] 83
Feb. 7	2.0	[a] 221	Aug. 15	.6	[a] 72
Feb. 11	2.0	[a] 222	Aug. 19	.4	[a] 56
Feb. 15	1.9	[a] 201	Aug. 23	.3	[a] 46
Feb. 19	1.9	[a] 203	Aug. 28	.2	[a] 40
Feb. 23	1.8	[a] 184	Aug. 31	2.7	468
Feb. 28	2.4	[a] 279	Sept. 1	6.3	3,926
Mar. 3	2.3	[a] 257	Sept. 5	2.0	[a] 215
Mar. 7	2.1	[a] 219	Sept. 9	1.8	[a] 190
Mar. 11	2.0	[a] 206	Sept. 13	1.6	[a] 156
Mar. 15	2.1	[a] 222	Sept. 17	1.2	[a] 102
Mar. 19	2.1	[a] 232	Sept. 21	.8	[a] 86
Mar. 23	1.8	[a] 186	Sept. 25	.5	[a] 62
Mar. 28	3.9	986	Sept. 29	.2	[a] 45
Apr. 3	2.5	[a] 285	Oct. 3	.0	[a] 37
Apr. 7	2.5	[a] 279	Oct. 7	.0	[a] 34
Apr. 11	2.4	[a] 255	Oct. 8	9.7	9,250
Apr. 15	2.3	[a] 239	Oct. 11	1.9	[a] 195
Apr. 19	2.2	[a] 223	Oct. 15	4.2	1,071
Apr. 23	2.2	[a] 226	Oct. 19	3.2	742
Apr. 28	2.7	474	Oct. 23	2.2	[a] 244
May 3	2.5	[a] 276	Oct. 28	1.5	[a] 125
May 7	2.5	[a] 275	Nov. 3	4.0	1,057
May 11	2.3	[a] 244	Nov. 7	3.1	694
May 15	2.3	[a] 247	Nov. 11	2.5	[a] 277
May 19	2.0	[a] 199	Nov. 15	2.2	[a] 241
May 23	2.1	[a] 228	Nov. 19	1.7	[a] 173
May 28	2.3	[a] 254	Nov. 23	1.3	[a] 128
June 3	1.8	[a] 182	Nov. 28	1.0	[a] 106
June 7	1.8	[a] 184	Dec. 3	.7	[a] 80
June 11	1.2	[a] 121	Dec. 7	.5	[a] 67
June 15	.9	[a] 89	Dec. 11	.4	[a] 56
June 19	.8	[a] 84	Dec. 15	.3	[a] 50
June 23	.7	[a] 75	Dec. 19	.2	[a] 45
June 28	.6	[a] 66	Dec. 23	.2	[a] 47
July 3	.6	[a] 67	Dec. 28	.2	[a] 45
July 7	.5	[a] 59			
July 11	.5	[a] 51			

[a] Taken at rocks.

Daily gage height, in feet, of Rio Salado near Guerrero, Tamaulipas, Mexico, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	2.2	2.3	2.7	2.7	2.0	0.4	2.05	5.95	0.1	1.2	0.8
2	2.7	2.2	2.3	2.6	2.6	1.9	.4	1.85	4.25	.1	1.1	.8
3	2.7	2.2	2.3	2.5	2.5	1.8	.6	1.65	3.05	.0	4.45	.7
4	2.7	2.1	2.2	2.5	2.5	1.7	.6	1.45	2.8	.0	4.75	.7
5	2.7	2.1	2.2	2.5	2.5	1.7	.6	1.25	1.95	.0	4.25	.6
6	2.7	2.1	2.2	2.5	2.55	1.6	.5	1.1	1.75	.0	3.35	.6
7	2.7	2.0	2.1	2.5	2.5	1.75	.5	1.0	1.55	.0	3.05	.5
8	2.6	2.0	2.1	2.4	2.4	1.55	.5	1.0	1.4	7.8	3.05	.5
9	2.6	2.0	2.1	2.4	2.4	1.35	.4	.9	1.7	2.75	4.35	.5
10	2.6	2.0	2.1	2.4	2.4	1.2	.4	.9	1.35	2.2	3.25	.4
11	2.7	2.0	2.0	2.35	2.3	1.2	.3	.8	1.2	1.85	2.45	.4
12	2.7	2.0	2.0	2.3	2.3	1.1	.3	.8	1.85	1.4	2.4	.4
13	2.6	2.0	2.0	2.3	2.45	1.1	.3	.7	1.6	1.15	2.3	.3
14	2.6	2.0	2.0	2.3	2.4	1.0	.3	.7	1.5	1.0	2.2	.3
15	2.6	1.9	2.1	2.3	2.3	.9	.2	.6	1.4	4.3	2.2	.3
16	2.5	1.9	2.1	2.3	2.2	.9	.2	.6	1.3	3.95	2.0	.3
17	2.5	1.9	2.1	2.2	2.1	.9	.2	.5	1.15	3.75	1.9	.3
18	2.7	1.9	2.1	2.2	2.0	.9	.2	.5	1.0	3.45	1.8	.3
19	2.6	1.9	2.1	2.2	2.0	.8	.1	.4	.9	3.15	1.7	.2
20	2.5	1.9	2.0	2.2	1.9	.8	.1	.4	.9	2.85	1.6	.2
21	2.45	1.8	1.9	2.2	1.8	.8	.1	.3	.8	2.65	1.6	.2
22	2.4	1.8	1.9	2.2	1.8	.7	.1	.3	.8	2.4	1.45	.2
23	2.4	2.0	1.8	2.2	2.3	.7	.0	.3	.7	2.15	1.3	.2
24	2.4	2.6	1.8	2.2	2.85	.6	.0	.3	.6	1.95	1.3	.2
25	2.3	2.55	2.4	2.25	2.45	.6	.0	.2	.5	1.75	1.2	.2
26	2.3	2.5	2.65	2.95	2.3	.6	2.5	.2	.4	1.65	1.1	.2
27	2.3	2.45	3.25	2.75	2.3	.6	2.95	.2	.4	1.55	1.0	.2
28	2.3	2.4	3.8	2.8	2.3	.6	3.95	.2	.3	1.45	1.0	.2
29	2.2	....	3.4	3.1	2.1	.5	3.2	.1	.2	1.4	.9	.1
30	2.2	....	3.1	3.0	2.5	.4	2.6	.1	.2	1.3	.8	.1
31	2.2	....	2.85	....	2.15	....	2.25	2.1	....	1.3	....	.1

RIO SAN JUAN BASIN.

RIO SAN JUAN NEAR SANTA ROSALIA RANCH, TAMAULIPAS, MEXICO.

Location.—Near the Santa Rosalia ranch, 12 miles above the original station established in 1900 near La Quemada, 18 miles above Camargo, and 24 miles above the confluence of the Rio San Juan and the Rio Grande, which is about 15 miles below Roma, Tex.; removed to present site July 14, 1902, to obviate effect of backwater from the Rio Grande during floods.

Records available.—October 1900, to December 31, 1911 except March and April, 1903.

Gage.—An inclined rod spiked to posts and a tree.

Channel.—The bed is sandy and shifts slightly in floods. Both banks are above flood level, are composed of sandy clay, and do not erode.

Discharge measurements.—Made from cable.

Zero flow.—Low water (no flow) was approximately zero on the gage prior to the flood of 1909, which swept away the station. The restored gage has not the same datum as the old. No flow is now −8.5 feet on the gage.

Cooperation.—Station installed and operated by the Mexican section of the International Boundary Commission.

Discharge measurements of San Juan River near Santa Rosalia ranch, Tamaulipas, Mexico, in 1911.

[By S. Jaso.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 3	−0.6	321	June 27	−3.1	31
Jan. 7	− .6	317	July 2	−3.7	30
Jan. 11	− .8	275	July 6	−3.2	30
Jan. 15	−1.1	247	July 10	−3.4	30
Jan. 20	−1.1	249	July 14	−3.6	29
Jan. 24	−1.3	199	July 17	−2.8	31
Jan. 28	−1.7	153	July 21	−3.7	28
Feb. 2	−1.8	151	July 26	− .7	749
Feb. 6	−2.1	111	July 28	−4.0	31
Feb. 11	−2.7	91	Aug. 2	−4.3	30
Feb. 15	−2.6	90	Aug. 6	−4.4	25
Feb. 20	−3.0	40	Aug. 10	−4.6	25
Feb. 24	−3.3	40	Aug. 14	−4.7	23
Feb. 27	−3.3	40	Aug. 18	−4.9	23
Mar. 2	−3.3	39	Aug. 22	−5.1	23
Mar. 6	−3.4	39	Aug. 27	−5.2	23
Mar. 10	−3.6	37	Sept. 2	−4.8	23
Mar. 15	−3.8	37	Sept. 4	−2.2	184
Mar. 20	−3.9	34	Sept. 7	−3.4	31
Mar. 22	1.2	1,251	Sept. 11	−3.9	26
Mar. 25	5.4	2,763	Sept. 17	−4.3	23
Mar. 28	2.9	2,461	Sept. 21	−4.4	23
Mar. 29	4.25	2,863	Sept. 25	−4.5	23
Apr. 3	− .1	876	Sept. 28	−4.5	23
Apr. 7	− .7	787	Oct. 2	−4.6	22
Apr. 11	− .05	760	Oct. 6	−4.6	22
Apr. 16	−2.1	122	Oct. 10	2.1	1,858
Apr. 20	−1.9	125	Oct. 12	−1.5	495
Apr. 25	−1.8	132	Oct. 16	−2.7	174
Apr. 26	9.5	10,361	Oct. 20	−3.1	31
Apr. 28	8.05	5,590	Oct. 25	−3.2	28
May 2	.5	841	Oct. 28	−3.4	23
May 6	.7	961	Nov. 6	1.0	1,390
May 8	3.5	2,628	Nov. 11	.5	984
May 10	3.6	2,918	Nov. 15	−1.3	454
May 12	1.9	1,853	Nov. 19	−2.0	281
May 16	.6	1,026	Nov. 22	−2.4	244
May 20	3.7	2,662	Nov. 25	−2.6	166
May 24	− .4	572	Dec. 2	−2.6	161
May 28	−1.5	192	Dec. 6	−2.6	160
June 2	−1.7	144	Dec. 10	−2.7	146
June 6	−1.9	125	Dec. 16	−3.0	34
June 10	−2.3	91	Dec. 20	−2.6	121
June 13	−2.6	71	Dec. 24	−2.7	86
June 18	−2.9	31	Dec. 28	−2.8	75
June 22	−3.4	31			

Daily gage height, in feet, of Rio San Juan near Santa Rosalia ranch, Tamaulipas, Mexico, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	−0.5	−1.9	−3.3	0.3	0.85	−1.3	−3.7	−4.05	−3.6	−4.5	−3.4	−2.7
2	− .6	−1.8	−3.3	.05	.5	−1.8	−3.7	−4.3	−4.8	−4.6	−3.3	−2.6
3	− .6	−1.9	−3.4	− .1	.55	−1.6	−3.55	−4.3	−4.8	−4.6	5.9	−2.6
4	− .6	−2.05	−3.4	− .2	.45	−1.3	−3.0	−4.3	−2.35	−4.6	7.55	−2.6
5	− .6	−2.1	−3.4	− .3	.6	−1.65	−3.05	−4.4	−2.4	−4.6	3.2	−2.6
6	− .6	−2.15	−3.4	− .6	.7	−1.8	−3.25	−4.4	−3.15	−4.6	.9	−2.6
7	− .6	−2.2	−3.5	− .75	4.35	−1.9	−3.3	−4.45	−3.45	−4.6	.35	−2.65
8	− .6	−2.3	−3.5	−1.0	3.35	−2.1	−3.4	−4.5	−3.65	−2.8	− .2	−2.7
9	− .65	−2.5	−3.5	−1.05	4.35	−2.2	−3.4	−4.5	−3.75	5.2	− .35	−2.7
10	− .75	−2.5	−3.6	−1.25	3.35	−2.35	−3.4	−4.6	−3.9	1.8	1.7	−2.75
11	− .8	−2.7	−3.6	− .1	2.75	−2.45	−3.5	−4.6	−3.95	− .6	.5	−2.8
12	− .85	−2.7	−3.65	− .55	1.75	−2.55	−3.5	−4.7	−4.1	−1.75	− .35	−2.85
13	− .9	−2.7	−3.7	−1.1	1.4	−2.65	−3.5	−4.7	−4.1	−2.25	− .9	−2.9
14	−1.0	−2.6	−3.7	−1.35	1.1	−2.7	−3.6	−4.75	−4.1	−2.5	−1.3	−2.9
15	−1.1	−2.6	−3.8	−1.65	.75	−2.8	−3.55	−4.8	−4.2	−2.5	−1.35	−3.0

Daily gage height, in feet, of Rio San Juan near Santa Rosalia ranch, Tamaulipas, Mexico, for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	−1.25	−2.7	−3.8	−2.05	0.6	−2.8	−2.8	−4.9	−4.2	−2.7	−1.55	−3.0
17	−1.45	−2.7	−3.8	−2.1	.55	−2.9	−2.8	−4.9	−4.3	−2.7	−1.6	−3.0
18	−1.5	−2.7	−3.85	−2.1	.35	−2.9	−2.65	−4.9	−4.3	−2.7	−1.7	−3.0
19	−1.5	−2.8	−3.9	−2.1	.1	−3.05	−2.5	−5.1	−4.4	−3.0	−2.0	−2.55
20	−1.1	−3.0	−3.9	−1.9	3.1	−3.25	−2.65	−5.1	−4.4	−3.1	−2.3	−2.6
21	−1.1	−3.2	−3.9	−1.9	1.1	−3.4	−3.65	−5.1	−4.4	−3.2	−2.3	−2.6
22	−1.1	−3.3	.95	−1.9	− .4	−3.45	−3.6	−5.1	−4.5	−3.2	−2.4	−2.7
23	−1.3	−3.3	.0	−1.9	− .3	−3.5	−3.7	−5.1	−4.5	−3.2	−2.5	−2.7
24	−1.4	−3.3	− .2	−2.4	− .55	−3.5	−3.7	−5.1	−4.5	−3.2	−2.6	−2.7
25	−1.95	−3.3	4.9	−1.8	− .45	−3.3	−3.7	−5.1	−4.5	−3.2	−2.6	−2.7
26	−1.7	−3.3	3.9	9.5	.35	−3.1	−1.9	−5.2	−4.5	−3.3	−2.6	−2.8
27	−1.7	−3.3	2.0	9.9	−1.05	−3.15	−3.75	−5.2	−4.5	−3.3	−2.6	−2.8
28	−1.7	−3.3	4.8	7.35	−1.45	−3.35	−4.0	−5.2	−4.5	−3.4	−2.7	−2.8
29	−1.7	....	5.95	4.95	−1.65	−3.5	−4.3	−5.2	−4.5	−3.4	−2.7	−2.8
30	−1.8	....	2.05	1.5	− .25	−3.5	−4.6	−5.3	−4.5	−3.5	−2.7	−2.8
31	−2.0	....	0.7	....	−1.15	....	−4.15	−3.8	....	−3.5	....	−2.8

INTERIOR BASINS IN NEW MEXICO.

GENERAL FEATURES.[1]

The southern portions of Arizona and New Mexico and the western part of Texas resemble the Great Basin in climate, and they contain a number of small interior basins [basins completely encircled by lines of water parting]. These are not so fully determined in extent as the Great Basin, but several of them may be approximately indicated. One of the largest lies between the Rio Grande and its eastern branch, the Pecos, extending from latitude 35° in central New Mexico to latitude 31° in western Texas. In its broadest part it is bounded on the west by the San Andreas and Organ Mountains, and on the east by the Sacramento and Guadalupe. Its area, of which two-thirds lies in New Mexico, is about 12,500 square miles. [In this area are Rio Tularosa and Rio La Luz.] Southwest of the Rio Grande, in Mexico, there is a larger tract of interior drainage, containing a number of saline lakes, and to one of these, Lake Guzman, the valley of the Mimbres River of New Mexico descends. Other basins adjacent on either side to that of the Mimbres are believed to bear the same relation to Lake Guzman, sloping gently toward it but contributing no water unless during periods of rare and exceptional storm. Yet other basins without exterior drainage are contiguous to these, and unite to form in southwestern New Mexico an arm of the Mexican district of interior drainage, the area within New Mexico probably falling between 7,000 and 7,500 square miles.

RIO TULAROSA BASIN.

RIO TULAROSA NEAR BENT, N. MEX.

Location.—In sec. 28, T. 13 S., R. 12 E., 2 miles east of Bent. No important tributaries within several miles of the station.

Records available.—May 24, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

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[1] Extract from Gilbert, G. K., Lake Bonneville: Mon. U. S. Geol. Survey, vol. 1, 1890, pp. 2-12, Pl. II. This report is now out of print but may be consulted in the libraries of most of the larger cities.

Winter flow.—Ice causes backwater at the gage during the winter months.

Diversions.—A number of small ditches divert water for irrigation above the station.

Accuracy.—Owing to a lack of discharge measurements no estimates of flow can be made.

Cooperation.—Station maintained in cooperation with the Territotial engineer and the United States Forest Service.

The following discharge measurement was made by H. B. Waha:

May 24, 1911: Gage height, 1.32 feet; discharge, 9.4 second-feet.

Daily gage height, in feet, of Rio Tularosa, near Bent, N. Mex., for 1911.

[Paul E. Jette, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	1.31	1.72	1.40	1.32	1.35	1.35	1.40
2	....	1.31	1.65	1.40	1.34	1.35	1.35	1.40
3	....	1.35	1.67	1.40	1.36	1.35	1.35	1.40
4	....	1.34	1.45	1.40	1.35	1.35	1.37	1.40
5	....	1.38	1.40	1.40	1.36	1.38	1.37	1.40
6	....	1.40	1.40	1.40	1.35	1.40	1.37	1.40
7	....	1.40	1.39	1.39	1.35	1.40	1.40	1.40
8	....	1.40	1.39	1.38	1.35	1.40	1.40	1.40
9	....	1.34	1.41	1.38	1.35	1.36	1.40	1.40
10	....	1.35	1.42	1.36	1.35	1.35	1.40	....
11	....	1.31	1.86	1.35	1.35	1.35	1.40	....
12	....	1.31	1.38	1.35	1.35	1.35	1.40	....
13	....	1.32	1.38	1.38	1.35	1.35	1.40	....
14	....	1.31	1.39	1.35	1.35	1.35	1.40	....
15	....	1.35	1.39	1.35	1.35	1.35	1.40	....
16	....	1.35	1.40	1.35	1.35	1.35	1.40	....
17	....	1.32	1.38	1.35	1.35	1.35	1.40	1.40
18	....	1.40	1.39	1.35	1.35	1.35	1.40	1.41
19	....	1.39	1.62	1.34	1.35	1.35	1.40	1.44
20	....	1.38	1.40	1.34	1.35	1.35	1.40	1.45
21	....	1.36	1.39	1.32	1.35	1.35	1.40	1.45
22	....	1.36	1.40	1.32	1.35	1.35	1.40	1.45
23	....	1.35	1.39	1.30	1.35	1.35	1.40	1.45
24	1.32	1.36	1.39	1.30	1.35	1.38	1.40	1.45
25	1.34	1.36	1.40	1.30	1.35	1.40	1.40	1.45
26	1.35	1.37	1.40	1.30	1.35	1.40	1.40	1.45
27	1.38	1.36	1.40	1.30	1.35	1.40	1.40	1.45
28	1.35	1.35	1.40	1.30	1.35	1.40	1.40	1.45
29	1.38	1.38	1.40	1.30	1.35	1.40	1.40	1.45
30	1.32	1.39	1.40	1.30	1.35	1.37	1.40	1.45
31	1.34	....	1.40	1.30	....	1.35	....	....

RIO TULAROSA AT MESCALERO, N. MEX.

Location.—At highway bridge one-fourth mile below the Indian agency at Mescalero; south of the center of T. 13 S., R. 12 E.

Records available.—November 27, 1910, to June 3, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from the highway bridge during high water and by wading at ordinary stages.

Accuracy.—Owing to the lack of discharge measurements no estimates of flow can be made.

Cooperation.—Station maintained in cooperation with the Territorial engineer and the United States Indian Office.

The following discharge measurement was made by H. B. Waha:
May 24, 1911: Gage height, 1.98 feet; discharge, 11.6 second-feet.

Daily gage height, in feet, of Rio Tularosa at Mescalero, N. Mex., for 1911.

[Hiram Jones, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	1.84	1.80	1.94	......	2.05	1.88	16	......	2.00	1.86	1.98	1.98	......
2	1.86	1.70	1.98	1.72	2.00	1.86	17	......	2.10	1.84	1.46	2.00	......
3	1.82	1.90	1.92	1.70	1.98	1.84	18	......	2.05	1.82	1.50	1.98	......
4	1.88	2.00	1.96	1.82	1.94	......	19	......	1.90	1.84	1.50	1.96	......
5	1.84	1.90	1.84	1.82	1.84	......	20	......	1.95	1.84	1.54	1.90	......
6	1.90	1.50	1.82	1.84	1.82	......	21	......	1.96	1.88	1.50	1.96	......
7	1.94	1.40	1.82	1.90	1.80	......	22	......	1.94	1.86	1.60	1.96	......
8	......	1.60	1.86	2.10	1.88	......	23	......	1.96	1.90	2.05	1.98	......
9	......	1.55	1.84	2.05	1.84	......	24	......	1.98	1.84	2.00	1.98	......
10	......	1.50	1.80	2.02	1.90	......	25	......	1.92	1.92	2.10	1.88	......
11	......	1.94	1.82	2.00	1.94	......	26	......	1.90	1.90	2.10	1.90	......
12	......	1.98	1.82	1.98	1.88	......	27	......	1.88	1.90	2.05	1.92	......
13	......	1.92	1.84	1.98	2.00	......	28	......	1.94	1.80	2.00	1.96	......
14	......	1.90	1.84	2.00	1.96	......	29	......	......	1.74	2.10	1.98	......
15	......	1.88	1.86	1.94	1.94	......	30	......	......	1.82	......	1.94	......
							31	......	......	1.82	......	1.98	......

RIO LA LUZ BASIN.

RIO LA LUZ NEAR LA LUZ, N. MEX.

Location.—In the Alamo National Forest, 1 mile above La Luz, in sec. 30, T. 15 S., R. 11 E.; half a mile below the mouth of Rio Fresnal, the nearest tributary.

Records available.—Fragmentary records August 13, 1910, to June 21, 1911.

Drainage area.—Not measured.

Gage.—Inclined staff. The original gage was washed out and a second gage established November 23, 1910, at a different datum.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—No data.

Diversions.—There are no important diversions above the station, but several below. The records at the station represent closely the natural run-off.

Accuracy.—Owing to the meagerness of the data no estimates of flow can be made.

Cooperation.—Station was maintained in cooperation with the United States Forest Service and the Territorial engineer.

Discharge measurements of Rio La Luz near La Luz, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 28	C. D. Miller	0.98	10.0
May 22	H. B. Waha	.90	3.4

Daily gage height, in feet, of Rio La Luz near La Luz, N. Mex., for 1911.

[M. W. Parker, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1						0.90	16						0.95
2						.80	17						.95
3						.80	18						.95
4						.90	19						1.00
5						.85	20						1.00
6						.85	21						1.50
7						.85	22					0.90	
8						.90	23						
9						.85	24						
10						1.00	25						
11						1.00	26					.95	
12						1.00	27					.90	
13						1.00	28	0.98				.90	
14						.90	29					.85	
15						1.00	30					.85	
							31					1.03	

MIMBRES RIVER BASIN.

MIMBRES RIVER NEAR FAYWOOD, N. MEX.

Location.—About 6 miles northeast of Faywood Hot Springs, and 10 miles from Faywood, a station on the Silver City branch of the Atchison, Topeka & Santa Fe Railway in sec. 7, T. 20 S., R. 10 W.

Records available.—April 8, 1908, to December 31, 1911.

Drainage area.—Approximately 450 square miles.

Gage.—An automatic recording gage installed August 13, 1909, at a point 200 feet upstream from the site of the chain gage originally installed. The chain gage datum was lowered 4 feet on July 8, 1909, and the datum of the recording gage is 3 feet lower than the new datum of the chain gage.

Channel.—Very shifting.

Discharge measurements.—Made from car and cable during high water, and by wading at other times.

Winter flow.—Practically no backwater from ice at this point.

Diversions.—Some water is diverted for irrigation below the station, and 400 feet above is the dam site of the Rio Mimbres reservoir, which is designed to control the flood water for irrigation.

Accuracy.—Owing to the shifting character of the stream and the few discharge measurements, no estimates of flow can be made.

Cooperation.—Station maintained in cooperation with the Territorial engineer.

Discharge measurements of Mimbres River near Faywood, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Feb. 1	C. D. Miller		0
Apr. 1	G. H. Russell	1.60	13.2
Aug. 17	do	.75	2.0

Daily gage height, in feet, of Mimbres River near Faywood, N. Mex., for 1911.

[R. C. Trujillo, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	1.40	1.60	1.50	1.20	1.00	1.05	0.75	1.70	1.04	0.62
2	....	1.50	1.60	1.50	1.20	1.00	.95	.75	1.55	1.03	.62
3	....	1.60	1.60	1.45	1.20	[a]1.00	.95	.75	1.50	1.03	.60
4	....	1.60	1.60	1.50	1.15	1.45	.95	.75	1.50	1.03	.60
5	....	1.70	1.60	1.45	1.15	1.40	.95	.75	....	.95	.60
6	....	1.70	1.55	1.45	1.15	1.30	.80	.75	....	.95	.60
7	....	1.80	1.55	1.45	1.15	1.45	.80	.75	....	.94	.60
8	....	1.75	1.50	1.45	1.15	1.50	.80	.70	....	.94	.60
9	....	1.75	1.50	1.45	1.15	1.40	.80	.85	....	.93	.60
10	....	1.70	1.50	1.45	1.15	[b]2.35	.75	.79	....	.92	.60
11	....	1.75	1.50	1.45	1.15	1.50	.75	.78	1.10	.92	.55
12	....	1.75	1.50	1.45	1.15	1.40	.75	.85	1.10	.88	.55
13	....	1.65	1.50	1.45	1.15	1.50	....	.85	1.10	.83	.55
14	....	1.65	1.45	1.45	1.15	1.40	....	.82	1.10	.80	.54
15	....	1.65	1.45	1.45	1.15	1.30	.75	.82	1.10	.80	.53
16	....	1.60	1.45	1.45	1.15	1.30	.75	.82	1.10	.77	.52
17	....	1.60	1.50	1.45	1.15	1.80	.75	.83	1.10	.75	.52
18	....	1.60	1.50	1.45	1.15	1.70	.75	.84	1.10	.75	.52
19	....	1.65	1.50	1.45	1.15	2.00	.75	.84	1.10	.78	.50
20	....	1.60	1.50	1.40	1.15	1.50	.70	1.35	1.10	.75	.50
21	....	1.70	1.50	1.40	1.35	1.30	.70	.90	1.10	.72	.50
22	....	1.60	1.50	1.40	1.60	1.30	1.20	.90	1.10	.70	.50
23	....	1.60	1.50	1.40	1.20	....	....	.85	1.10	.67	.50
24	....	1.65	1.50	1.40	1.00	....	1.00	.85	1.10	.66	.50
25	....	1.60	1.50	1.35	1.00	....	1.00	.85	1.08	.65	.50
26	....	1.70	1.50	1.35	1.00	....	1.00	.85	1.06	.65	.50
27	....	1.60	1.50	1.30	1.00	....	1.00	.85	1.05	.63	.50
28	1.20	1.65	1.50	1.25	1.00	1.15	1.00	.82	1.05	.62	.50
29	....	1.70	1.45	1.25	1.00	1.10	1.00	.84	1.05	.62	.50
30	....	1.65	1.50	1.20	1.00	1.15	.80	2.00	1.05	.62	.50
31	....	1.65	....	1.20	....	1.10	.80	....	1.05	....	.50

[a] Maximum gage height July 3, 3.7 feet.

[b] Maximum gage height July 10, 3.8 feet.

NOTE.—River dry from Jan. 1 to Feb. 27.

CAMERON CREEK AT FORT BAYARD, N. MEX.

Location.—Near the pumping plant at Fort Bayard, in sec. 25, T. 17 S., R. 13 W., 1 mile below the mouth of the nearest tributary, Beartooth Creek—an intermittent stream.

Records available.—January 17, 1907, to September 11, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made by wading. For the greater part of the year the flow comes from springs and amounts to less than 1 second-foot.

Winter flow.—Ice does not appreciably affect the flow at this station.

Diversions.—The intake for the Army post water supply is above the station and a small amount of water is also diverted for garden irrigation.

Accuracy.—Owing to the shifting character of the stream and a lack of discharge measurements, no estimates of flow can be made.

Cooperation.—Station maintained in cooperation with the Territorial engineer and the United States Forest Service.

Daily gage height, in feet, of Cameron Creek at Fort Bayard, N. Mex., for 1911.

[T. J. McBurney, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	....	1.67	1.35	1.35	1.35	1.35	....	....
2	....	1.65	1.35	1.35	1.35	1.35	....	....
3	....	1.58	1.35	1.35	1.35	1.35	....	....
4	....	1.55	1.35	1.35	1.35	1.35	....	....
5	....	1.55	1.35	1.35	1.35	1.35	....	....
6	....	1.52	1.35	1.35	1.35	1.35	....	....
7	....	1.42	1.35	1.35	1.35	1.35	....	....
8	....	1.38	1.35	1.35	1.35	1.35	....	....
9	....	1.35	1.35	1.35	1.35	1.35	....	....
10	....	1.35	1.35	1.35	1.35	2.20	....	....
11	....	1.35	1.35	1.35	1.35	....	....	3.00
12	....	1.35	1.35	1.35	1.35	....	....	....
13	....	1.35	1.35	1.35	1.35	....	....	....
14	....	1.35	1.35	1.35	1.35	....	....	....
15	....	1.35	1.35	1.35	1.35	....	....	....
16	....	1.35	1.35	1.35	1.35	....	....	....
17	....	1.35	1.35	1.35	1.35	....	....	....
18	....	1.35	1.35	1.35	1.35	....	....	....
19	....	1.35	1.35	1.35	1.35	....	....	....
20	....	1.35	1.35	1.35	1.35	....	....	....
21	....	1.35	1.35	1.35	1.72	....	....	....
22	....	1.35	1.35	1.35	1.35	....	....	....
23	....	1.35	1.35	1.35	1.35	....	3.80	....
24	....	1.35	1.35	1.35	1.35	....	....	....
25	....	1.35	1.35	1.35	1.35	....	....	....
26	....	1.35	1.35	1.35	1.35	....	....	....
27	....	1.35	1.35	1.35	1.35	....	....	....
28	1.80	1.35	1.35	1.35	1.35	....	....	....
29	....	1.35	1.35	1.35	1.35	....	....	....
30	....	1.35	1.35	1.35	1.35	....	....	....
31	....	1.35	....	1.35	....	....	....	....

NOTE.—Creek dry from Jan. 1 to Feb. 27.

STEVENS CREEK NEAR FORT BAYARD, N. MEX.

Location.—About 3 miles north of Fort Bayard and 2 miles above the mouth, in sec. 12, T. 17 S., R. 13 W. No tributary below the station.

Records available.—Fragmentary records January 17, 1907, to October 28, 1911.

Drainage area.—Not measured.

Gage.—Inclined staff whose position and datum have remained unchanged.

Channel.—Somewhat shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice has practically no effect on the discharge.

Diversions.—The intake for the planting station ditch of the Forest Service is located above the station.

Accuracy.—Owing to a lack of discharge measurements, no estimates of flow can be made.

Cooperation.—Station was maintained in cooperation with the Territorial engineer and the Engineer Corps of the U. S. A.

Gage height, in feet, of Stevens Creek near Fort Bayard, N. Mex., 1911.

Date.	Gage height.	Date.	Gage height.
June 22	1.6	Sept. 30	1.2
July 9	1.5	Oct. 3	1.5
July 10	1.8	Oct. 4	1.2
Aug. 23	1.5	Oct. 27	1.1
Sept. 11	1.7	Oct. 28	1.3
Sept. 20	1.4		

NOTE.—Creek was dry on all other days during 1911.

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous measurements have been made on streams tributary to the western Gulf of Mexico.

Miscellaneous measurements in western Gulf of Mexico drainage basins in 1911.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet	*Sec.-ft.*
Nov. —	San Antonio River	Gulf of Mexico	Hot wells, San Antonio. Tex.		16
May 30[a]	Guadalupe River	San Antonio River	1,500 yards above dam at Seguin, Tex.		394
1910	Comal River	Guadalupe River	Highway bridge at New Braunfels, Tex.		299
1911	do	do	do		267
Nov. —	Leona River	Frio River	Brickyard crossing, 1½ miles below Uvalde, Tex.		.0
July 18	Rio Grande		South Fork, Colo	2.82	391
Oct. 3	Clear Creek	Rio Grande	Santa Maria Lake, Colo	1.68	73
Aug. 9	do	do	Texas Club, Colo	2.50	94
July 22	San Antonio Creek	Conejos River	1 mile south of Antonito, Colo.		[b] 50
Aug. 9	do	do	do		[b] 3
10	Los Pinos Creek	San Antonio Creek	Osier, Colo		[b] 7
Dec. 27	Costilla Creek	Rio Grande	Costilla, N. Mex		[b] 25
27	do	do	Eastdale, Colo		.0
Jan. 28	Rio Fernando de Taos	do	Near Taos, N. Mex	.78	2.1
Mar. 12	do	do	do	.95	5.1
Apr. 22	do	do	do	1.17	13.7
June 9	do	do	do	1.00	5.2
Aug. 14	Big Chama Creek	Big Chama River	Chama, N. Mex		[b] 12.0
May 6	Medio Creek	Rio Chiquito	Near Nambe, N. Mex	1.05	3.9
6	Nambe Creek	Rio Grande	Nambe, N. Mex		19.0
6	do	do	Near Nambe, N. Mex	1.30	26
6	Tesuque Creek	Nambe Creek	Tesuque Pueblo, N. Mex		[b] 3.0
6	Ditch from Medio Creek		Nambe, N. Mex		1.6
Mar. 19	Santa Fe Creek	Rio Grande	3 miles above Santa Fe. N. Mex.		6.0
Jan. 24	do	do	2 miles above Santa Fe, N. Mex.	[c] .40	[b] 2.0
Mar. 8	do	do	do		9.7
8	do	do	1 mile above Santa Fe, N. Mex.		7.1
14	do	do	La Banada, N. Mex		[b] 8.0
Nov. 14	Galisteo Creek	do	Above Lamy, N. Mex		[b] 2.5
14	do	do	Lamy, N. Mex		[b] 2.5
July 27	do	do	Los Cerrillos, N. Mex		[b] 4.0
29	do	do	do		[b] 4.0
Nov. 14	do	do	Mouth, N. Mex		[b] 4.0
11	San Cristobal Creek	Galisteo River	Kennedy, N. Mex		[b] 2.0
11	Jaspe Creek	San Cristobal Creek	2 miles south of Kennedy, N. Mex.		.0
July 28	Cottonwood Creek	Bluewater Creek	Above mouth of Bluewater Creek, N. Mex.		[b] 25
28	Bluewater Creek	Cottonwood Creek	Near Copperton, N. Mex		[b] 100
28	do	do	Above confluence with Cottonwood Creek, N. Mex.		[b] 75
Mar. 11	Pecos River	Rio Grande	San Miguel, N. Mex		92
11	do	do	1 mile above La Cuesta, N. Mex.		77
11	do	do	La Cuesta, N. Mex		87
10	do	do	4 miles below La Cuesta, N. Mex.		92
11	do	do	1 mile below Anton Chico, N. Mex.		81
13	do	do	1 mile below Colonias, N. Mex.		20
Nov. 11	do	do	Santa Rosa, N. Mex		[b] 20
Mar. 14	do	do	6 miles below Santa Rosa, N. Mex.		86
14	do	do	4 miles below Porte de Luna, N. Mex.		68
Jan. 13	do	do	Fort Sumner, N. Mex		[b] 3.0
May 11	do	do	do		[b] 100
Jan. 5	Willow Creek	Pecos River	Cowles, N. Mex		[d] .25
Oct. 31	San Antonio Creek	do	Below Cowles, N. Mex		[b] 3.0
31	Cebadilla Creek	do	do		[b] 4.0

[a] Rod float measurement by P. S. Knittel, city engineer of Seguin, Tex.
[b] Estimated.
[c] From old United States Geological Survey gage.
[d] Estimated under ice conditions.

Miscellaneous measurements in western Gulf of Mexico drainage basin in 1911—Contd.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Jan. 6	Holy Ghost Creek	Pecos River	Lloyd's ranch, N. Mex		[a]4.0
Mar. 31	do	do	Mouth, N. Mex		[a]2.5
May 25	do	do	do		[a]4.0
Oct. 31	do	do	Below Cowles, N. Mex		[a]5.0
Mar. 31	Indian Creek	do	Mouth, N. Mex		[a]1.5
May 25	do	do	do		[a]1.0
Aug. 7	Dark Canyon	do	Santa Fe-Pecos trail, N. Mex.		[a].5
May 25	El Macho Creek	Dark Canyon	Mouth, N. Mex		[a].5
Aug. 7	do	do	Santa Fe-Pecos trail, N. Mex.		[a]1.0
Mar. 31	do	do	Mouth, N. Mex		[a]3.0
31	Dalton Creek	Pecos River	do		[a]2.0
May 25	do	do	do		[b].5
Aug. 7	Indian Creek	do	10 miles below Cowles, N. Mex.		[a]2.0
Oct. 31	do	do	do		[a]1.0
Aug. 20	Gallinas River	do	Las Vegas, N. Mex		[a].25
Nov. 11	Pintada Canyon	do	Pintada, N. Mex		.0
June 1	Rio Ruidoso	do	6 miles west of Ruidoso, N. Mex.	1.60	10.3
Nov. 15	Peansco River	do	5 miles below Elk, N. Mex		60
Jan. 18	Hope ditch	From Penasco River	Head of ditch, N. Mex		33
18	do	do	Charley White draw, N. Mex.		20
Nov. —	San Felipe Creek	Rio Grande	Just south of Southern Pacific Railroad bridge, at Del Rio, Tex.		71
—	Las Moras Creek	do	Near Brackettville, Tex.		8.4

[a] Estimated.

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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 309

SURFACE WATER SUPPLY OF THE UNITED STATES

1911

PART IX. COLORADO RIVER BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

ROBERT FOLLANSBEE, W. B. FREEMAN
AND G. CLYDE BALDWIN

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SURFACE WATER SUPPLY OF THE COLORADO RIVER BASIN, 1911.

By **ROBERT FOLLANSBEE, W. B. FREEMAN, and G. CLYDE BALDWIN.**

AUTHORITY FOR INVESTIGATIONS.

This volume is Part IX of a series of 12 reports presenting results of measurements of flow made on certain streams in the United States during the calendar year 1911. The reports are listed below.

Papers on surface water supply of the United States, 1911.

Part.[a]	No.	Title.	Part.[a]	No.	Title.
I	301	North Atlantic coast.	VI	306	Missouri River basin.
II	302	South Atlantic coast and eastern Gulf of Mexico.	VII	307	Lower Mississippi River basin.
			VIII	308	Western Gulf of Mexico.
III	303	Ohio River basin.	IX	309	Colorado River basin.
IV	304	St. Lawrence River basin.	X	310	Great Basin.
V	305	Upper Mississippi River and Hudson Bay basins.	XI	311	Pacific coast in California.
			XII	312	North Pacific coast.

[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394), which contains the following paragraph:

> *Provided*, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal year ending June 30:

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work various private and State organizations have cooperated. Acknowledgments for such cooperation are made on page 15, and also in connection with the description of each station affected by the cooperative work.

PUBLICATIONS.

Measurements of stream flow have been made at more than 2,000 points in the United States and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1911 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points in the United States, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular surface water-supply papers from time to time. A complete list of the gaging stations maintained by the Survey to and including 1910 and a list of the papers relating to the water supply of the country has been published by the Survey as Water-Supply Paper 280. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119.

For each calendar year there has been prepared a report embodying the stream-flow data collected during that year, which has been published either as a part of the annual report of the Director, as a bulletin, or as a water-supply paper, as shown by the following table:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge	1884 to September, 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years.)	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	do	1903.
WS 124 to 135	do	1904.
WS 165 to 178	do	1905.
WS 201 to 214	Complete data, except descriptions	1906.
WS 241 to 252	Complete data	1907–8.
WS 261 to 272	do	1909.
WS 281 to 292	do	1910.
WS 301 to 312	do	1911.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1911. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1911, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, and 301, which contain records for the New England streams from 1903 to 1911.

Numbers of water-supply papers containing results of stream measurements, 1899–1911.

	1899 [a]	1900 [b]	1901	1902	1903	1904
North Atlantic coast (St. John River to York River)	35	47, [c] 48	65, 75	82	97	[d] 124, [e] 125, [f] 126
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[g] 35, 36	48	65, 75	[g] 72, 83	[g] 97, 98	[f] 126, 127
Ohio River basin	36	48, [h] 49	65, 75	83	98	128
St. Lawrence River and Great Lakes	36	49	65, 75	[i] 82, 83	97	129
Hudson Bay and upper Mississippi River	36	49	[j] 65, 66, 75	[j] 83, 85	[j] 98, 99, 100	[j] 128, 130
Missouri River	[k] 36, 37	49, [l] 50	66, 75	84	99	130, [m] 131
Lower Mississippi River	37	50	[j] 65, 66, 75	[j] 83, 84	[j] 98, 99	[j] 128, 131
Western Gulf of Mexico	37	50	66, 75	84	99	132
Colorado River	[n] 37, 38	50	66, 75	85	100	133
Great Basin	38, [o] 39	51	66, 75	85	100	133, [p] 134
Pacific coast in California	38, [q] 39	51	66, 75	85	100	134
North Pacific coast	38	51	66, 75	85	100	135

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.

[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

[c] Wissachickon and Schuylkill rivers to James River.

[d] New England rivers only.

[e] Hudson River to Delaware River, inclusive.

[f] Susquehanna River to Yadkin River, inclusive.

[g] James River only.

[h] Scioto River.

[i] Lake Ontario and tributaries to St. Lawrence River proper.

[j] Tributaries of Mississippi from east.

[k] Gallatin River.

[l] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

[m] Platte and Kansas rivers.

[n] Green and Gunnison rivers and Grand River above junction with Gunnison.

[o] Mohave River only.

[p] Great Basin in California, excepting Truckee and Carson drainage basins.

[q] Kings and Kern rivers and south Pacific coast drainage basins.

Numbers of water-supply papers containing results of stream measurements, 1899–1911—Continued.

	1905	1906	1907–8	1909	1910	1911
North Atlantic coast (St. John River to York River)	[a]165, [a]166, [b]167	[c]201, [b]202, [c]203	241	261	281	301
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[c]167, 168	[c]203, 204	242	262	282	302
Ohio River Basin	169	205	243	263	283	303
St. Lawrence River and Great Lakes	170	206	244	264	284	304
Hudson Bay and upper Mississippi River	171	207	245	265	285	305
Missouri River	172	208	246	266	286	306
Lower Mississippi River	[d]169, 173	[d]205, 209	247	267	287	307
Western Gulf of Mexico	174	210	248	268	288	308
Colorado River	175, [e]177	211	[e]249	269	289	309
Great Basin	176, [f]177	212, [f]213	250, [f]251	270, [f]271	290	310
Pacific coast in California	177	213	251	271	291	311
North Pacific coast	[g]177, 178	214	252	272	292	312

[a] New England rivers only.
[b] Hudson River to Delaware River, inclusive.
[c] Susquehanna River to Yadkin River, inclusive.
[d] Tributaries of Mississippi from east.
[e] Below junction with Gila.
[f] Great Basin in California, excepting Truckee and Carson drainage basin.
[g] Rogue, Umpqua, and Siletz rivers only.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile; and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off depth in inches, and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge (second-feet per square mile).	Run-off depth in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.........	0.03719	1.041	1.079	1.116	1.153
2.........	.07438	2.083	2.157	2.231	2.306
3.........	.11157	3.124	3.236	3.347	3.459
4.........	.14876	4.165	4.314	4.463	4.612
5.........	.18595	5.207	5.393	5.578	5.764
6.........	.22314	6.248	6.471	6.694	6.917
7.........	.26033	7.289	7.550	7.810	8.070
8.........	.29752	8.331	8.628	8.926	9.223
9.........	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge (second-feet).	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.........	1.983	55.54	57.52	59.50	61.49
2.........	3.967	111.1	115.0	119.0	123.0
3.........	5.950	166.6	172.6	178.5	184.5
4.........	7.934	222.1	230.1	238.0	246.0
5.........	9.917	277.7	287.6	297.5	307.4
6.........	11.90	333.2	345.1	357.0	368.9
7.........	13.88	388.8	402.6	416.5	430.4
8.........	15.87	444.3	460.2	476.0	491.9
9.........	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply values for one day by the number of days.

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.

1 second-foot for one year equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one day equals 86,400 cubic feet.

1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.

100 California miner's inches equals 18.7 United States gallons per second.

100 California miner's inches for one day equals 4.96 acre-feet.

100 Colorado miner's inches equals 2.60 second-feet.

100 Colorado miner's inches equals 19.5 United States gallons per second.

100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-feet.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data, so far as available, are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections

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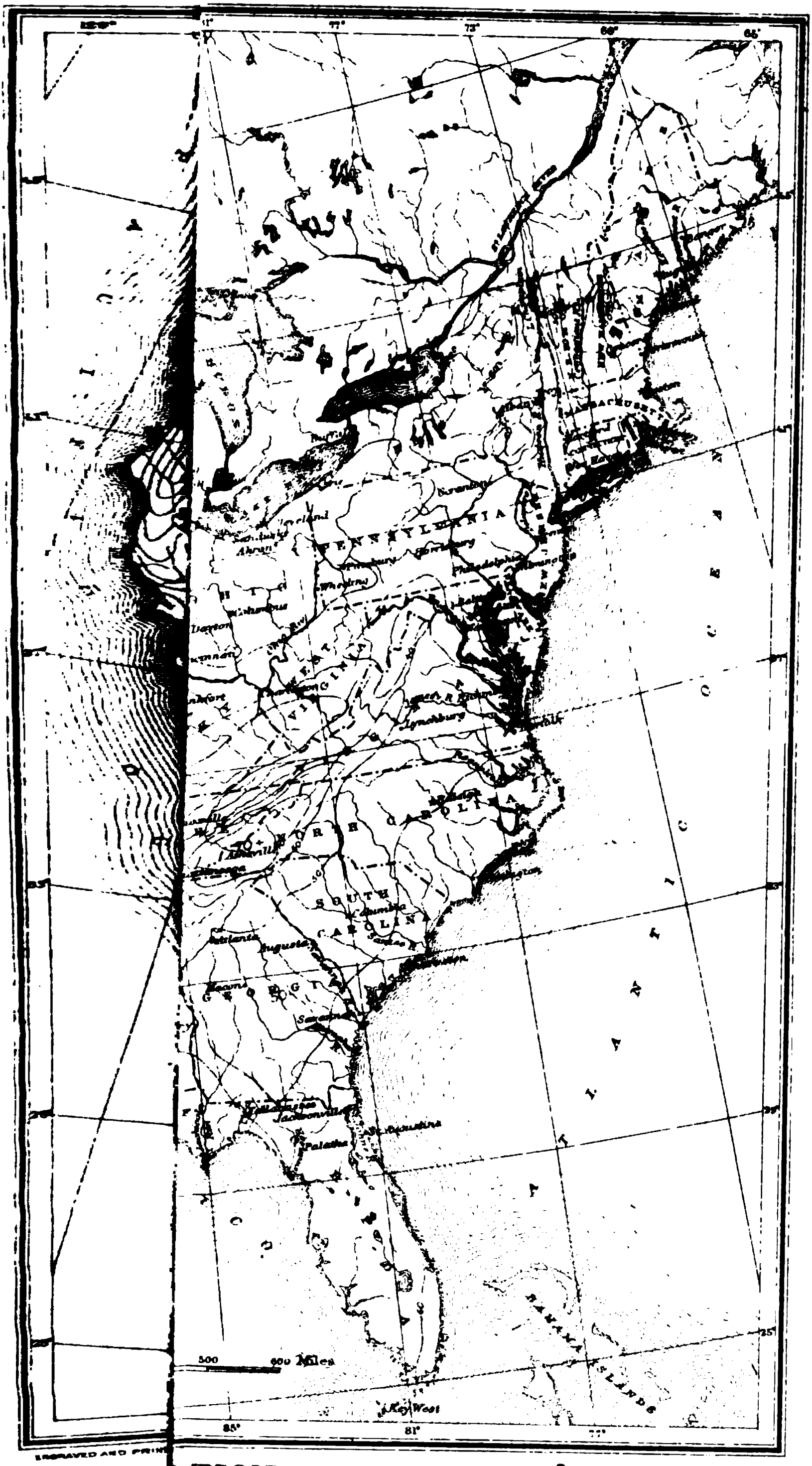
WATER-SUPPLY PAPERS 301 TO 312 PLATE I



ENGRAVED AND PRIN

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Prepared by Henry Gannett
mainly from data of the
United States Geological Survey
and United States Weather Bureau

to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage heights and daily discharge, as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater periods.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise in the column at "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 10, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plates I and II show the average precipitation and run-off in the United States as determined from the measurements of stream flow made by the Geological Survey and records of rainfall collected by the Weather Bureau; Plate III shows typical gaging stations, indicating the method of suspending the current meter; Plate IV shows current meters[1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of steam-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate" within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should, therefore, be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general, the base data collected each year by the Survey engineers are published, not only to comply with the law, but also to

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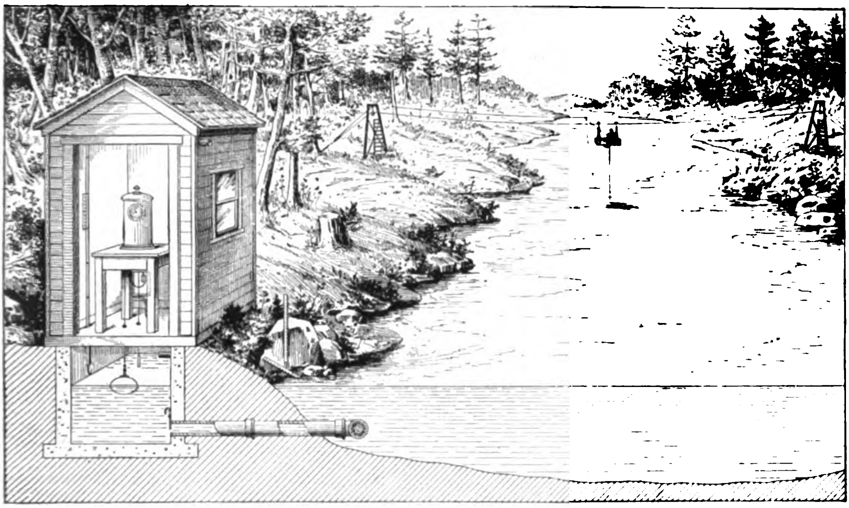
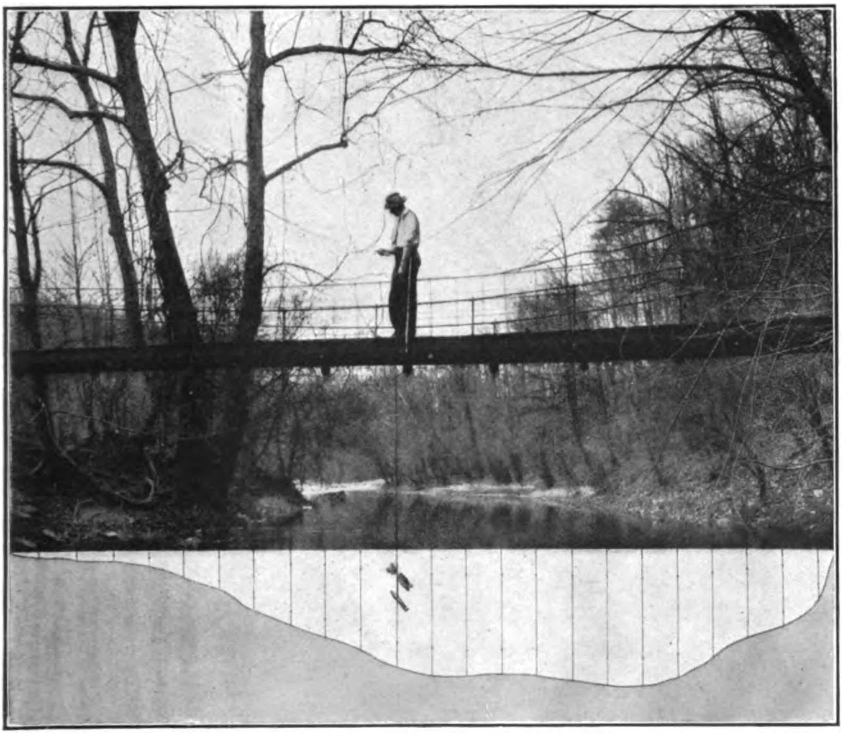
[1] See Hoyt, J. C., and others; Use and care of current meter as practiced by the United States Geological Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

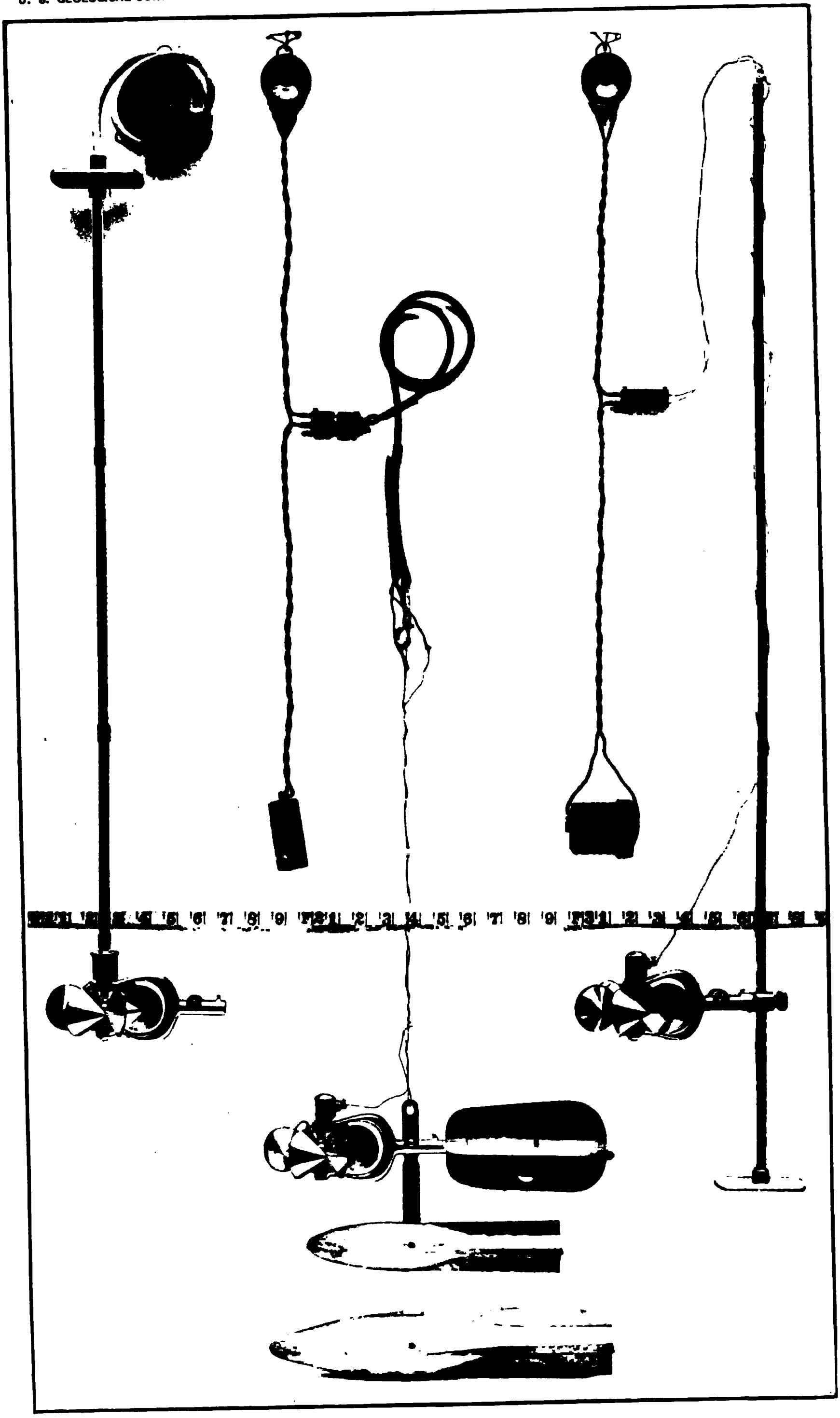


A. CABLE STATION WITH AUTOMATIC GAGE.



B. FOR BRIDGE MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION AND ASSISTANCE.

The stream gaging work in Colorado, Wyoming, Utah, and New Mexico was conducted in cooperation with National bureaus and State organizations and was assisted by many private parties.

The United States Forest Service provided a hydrographer for measuring the streams on the national forests and also furnished records of gage heights.

The United States Reclamation Service furnished the field data for a number of stations in the Grand River basin.

The United States Weather Bureau furnished the gage heights for Grand River near Fruita.

The State engineer of Colorado, Mr. C. W. Comstock, cooperated in the maintenance of a number of stations on Grand River and furnished the complete records for many other stations, mostly those in the Yampa, White, and San Juan basins.

The territorial engineer of New Mexico, Mr. C. D. Miller, paid the field expenses incurred at the stations in San Juan basin, and was instrumental in obtaining cooperation with a number of private parties.

The State engineer of Utah, Mr. Caleb Tanner, cooperated in maintaining stations in that State.

Special acknowledgments are due Mr. Horace W. Sheley, consulting engineer, for assistance in stream-gaging work in Utah; the Denver Reservoir Irrigation Co. for records on Fraser River near Fraser, Colo., the San Juan Power & Light Co., for records of flow of San Juan River; the Colorado Yule Marble Co., for the field data for Crystal River at Marble, Colo.; the Central Colorado Power Co., for automatic gage on Grand River at Glenwood Springs and the gage records during the first half of the year; the Eden Irrigation Co., for field data for the Big Sandy River at Poston's ranch, near Big Sandy, Wyo.

The Socorro Mines Co. furnished records of flow of Whitewater Creek near Mogollon, N. Mex.

DIVISION OF WORK.

Field data for the Grand River drainage basin were collected under the direction of W. B. Freeman, district engineer, by J. B. Stewart, E. O. Christiansen, G. H. Russell, junior engineers, and H. B. Waha and O. M. Wimmer, Forest Service hydrographers.

Field data for the San Juan and Gila river basins in New Mexico were collected by G. H. Russell, under the direction of W. B. Freeman, district engineer, and C. D. Miller, Territorial engineer.

Field data for all stations in Arizona have been collected under the direction of W. B. Clapp and H. D. McGlashan, by C. C. Jacob.

Field data in the Colorado basin in Utah were collected under the direction of E. C. La Rue and G. C. Baldwin, by J. C. Dort, G. H. Canfield, and Leonard Tanner. Rating curves and many of the estimates were made under the direction of Robert Follansbee and E. A. Porter, by G. A. Gray, Raymond Richards, and C.W. Bennett.

The completed data were prepared for publication by H. D. Padgett. The report has been edited by Mrs. B. D. Wood.

GREEN RIVER AND THE MAIN COLORADO.

GREEN RIVER NEAR KENDALL, WYO.

Location.—At Kendall forest ranger station, in sec. 23, T. 38 N., R. 110 W., on the southern border of the Yellowstone National Forest, about 6 miles north of Kendall post office. Nearest tributary, Gypsum Creek, enters a short distance below the station.

Records available.—August 3, 1910, to November 6, 1911.

Drainage area.—Not measured.

Gage.—Chain gage. Datum was raised 2.52 feet September 24, 1910, and all previous records corrected by that amount.

Channel.—Apparently permanent.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater, and records are discontinued during the winter months.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Green River of 354 second-feet, practically all below the station.

Accuracy.—Conditions are favorable for accurate results and the estimates are considered reliable.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Green River near Kendall, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 23	Wimmer and Belknap	3.45	470	June 27	G. E. Belknap	4.60	1,510
24	.....do	3.60	563	Aug. 1	.....do	3.60	664
25	.....do	3.75	698	Sept. 17	Belknap and Hill	3.00	236

Daily gage height, in feet, and discharge, in second-feet, of Green River near Kendall, Wyo., for 1910.

[Albert Hill, observer.]

Day.	August.		September.		October.		Day.	August.		September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1							16						
2	3.75	700			2.85	135	17						
3			3.1	260	2.8	110	18	3.3	380				
4					2.8	110	19					2.75	85
5							20	3.5	510			2.8	110
6			3.0	210	2.8	110	21	3.5	510				
7			2.9	160	2.8	110	22			3.05	235	2.7	60
8					2.8	110	23	3.4	440			2.8	110
9	3.5	510	2.85	135	2.8	110	24			3.0	210		
10	3.4	440			2.8	110	25					2.8	110
11	3.4	440			2.8	110	26					2.8	110
12	3.5	510			2.75	85	27						
13	3.5	510			2.8	110	28						
14	3.5	510			2.75	85	29			2.85	135		
15							30						
							31						

Daily gage height, in feet, of Green River near Kendall, Wyo., for 1911.

[Albert Hill, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			4.0	4.6		3.1	3.0	
2			4.2	4.5		3.1		2.8
3						3.2	3.0	2.8
4						3.2	3.0	2.8
5			4.35			3.2	3.0	2.8
6			4.4			3.2	2.9	2.8
7		3.2	4.5	4.7	3.35	3.2	2.9	
8		3.35	4.7	4.8	3.3	3.1	2.9	
9		3.4			3.3	3.1	3.0	
10		3.3	4.5	4.3	3.3	3.0		
11		3.3	4.5	4.3	3.4			
12		3.3	4.8		3.4		3.0	
13		3.55	5.0		3.4		3.0	
14		3.5	5.2		3.4		3.0	
15		3.5	5.4		3.4	3.1		
16		3.5	5.6	4.4		3.1		
17		3.45	5.8	4.4		3.1		
18		3.4	5.9	4.4		3.0		
19		3.45	5.9	4.4		2.9		
20		3.3	5.8					
21		3.3				2.9		
22		3.3	5.7		3.35	2.9		
23		3.45	5.6		3.3	2.9		
24		3.6	5.4		3.25	2.9		
25		3.75	5.2		3.2			
26	2.85		4.8		3.1	2.9		
27	2.9		4.6	4.2	3.1			
28	2.9	3.5	4.6	3.9	3.1	2.9		
29	2.85	3.5	4.7	3.7	3.1	2.9		
30		3.5	4.6	3.7	3.1	2.95		
31		3.8		3.7				

Daily discharge, in second-feet, of Green River near Kendall, Wyo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	....	900	1,460	....	260	210	....
2	....	....	1,080	1,360	....	260	....	110
3	....	....	....	....	....	320	210	110
4	....	....	....	....	....	320	210	110
5	....	....	1,220	....	....	320	210	110
6	....	....	1,260	....	....	320	160	110
7	....	320	1,360	1,560	410	320	160	....
8	....	410	1,560	1,660	380	260	160	....
9	....	440	....	....	380	260	210	....
10	....	380	1,360	1,170	380	210	....	....
11	....	380	1,360	1,170	440	....	....	....
12	....	380	1,660	....	440	....	210	....
13	....	545	1,880	....	440	....	210	....
14	....	510	2,110	....	440	....	210	....
15	....	510	2,350	....	440	260	....	....
16	....	510	2,600	1,260	....	260	....	....
17	....	475	2,870	1,260	....	260	....	....
18	....	440	3,010	1,260	....	210	....	....
19	....	475	3,010	1,260	....	160	....	....
20	....	380	2,870	....	....	....	....	....
21	....	380	....	....	....	160	....	....
22	....	380	2,730	....	410	160	....	....
23	....	475	2,600	....	380	160	....	....
24	....	580	2,350	....	350	160	....	....
25	....	700	2,110	....	320	....	....	....
26	135	....	1,660	....	260	160	....	....
27	160	....	1,460	1,080	260	....	....	....
28	160	510	1,460	820	260	160	....	....
29	135	510	1,560	660	260	160	....	....
30	....	510	1,460	660	260	185	....	....
31	....	740	....	660	....	....	....	....

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

GREEN RIVER NEAR BRIDGEPORT, UTAH.

Location.—At the ferry of the Jarvis or Park Live Stock Co. in sec. 3, T. 1 N., R. 25 E., Salt Lake base and meridian, 3 miles south of the town of Bridgeport, Utah.

Records available.—October 12, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff, consisting of two vertical sections and one inclined section.

Channel.—Gravel and sand; may shift at high stages.

Discharge measurements.—Made from the ferryboat.

Winter flow.—Relation of gage height to discharge is affected by ice during the winter months.

Diversions.—None.

Accuracy.—Estimates may be considered excellent for the range of stage for which gage heights are available.

Cooperation.—Maintained in cooperation with the State of Utah.

The following discharge measurement was made by E. C. La Rue:

October 13, 1911: Gage height, 3.45 feet; discharge, 968 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of Green River near Bridgeport, Utah, for 1911.

[Carl E. Johnson, observer.]

Day.	October.		November.		December.	Day.	October.		November.		December.
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.
1	....	....	3.25	845	3.0	16	3.4	950	3.2	810	3.0
2	....	....	3.25	845	3.0	17	3.4	950	3.2	810	3.0
3	....	....	3.2	810	3.0	18	3.4	950	3.25	845	3.0
4	....	....	3.2	810	3.0	19	3.4	950	3.25	845	3.0
5	....	....	3.2	810	3.0	20	3.35	915	3.3	880	3.0
6	....	....	3.2	810	3.0	21	3.3	880	3.4	950	3.0
7	....	....	3.2	810	3.0	22	3.3	880	3.4	950	3.0
8	....	....	3.2	810	3.0	23	3.3	880	3.4	950	3.0
9	....	....	3.2	810	3.0	24	3.3	880	3.3	950	3.0
10	....	....	3.2	810	3.0	25	3.3	880	3.3	880	3.0
11	....	....	3.2	810	3.0	26	3.3	880	3.25	845	3.0
12	3.5	1,020	3.2	810	3.0	27	3.3	880	3.2	810	3.0
13	3.45	985	3.2	810	3.0	28	3.3	880	3.0	....	3.0
14	3.4	950	3.2	810	3.0	29	3.3	880	3.0	....	3.0
15	3.4	950	3.2	810	3.0	30	3.3	880	3.0	....	3.0
						31	3.3	880	....	....	3.0

NOTE.—Relation of gage height to discharge probably affected by ice Nov. 28 to Dec. 31. Daily discharge determined from a rating curve well defined for all stages.

Monthly discharge of Green River near Bridgeport, Utah, for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October 12-31	1,020	880	[a] 915	36,300	A.
November	950	....	822	48,900	B.
December	....	....	[b] 580	35,700	C.

[a] Discharge Nov. 28-30 estimated at 640 second-feet. [b] Estimated.

GREEN RIVER NEAR ELGIN,[1] UTAH.

Location.—At the highway bridge 200 feet upstream from the Denver & Rio Grande Railroad bridge at Green River railroad station near Elgin, Utah, in sec. 15, T. 21 S., R. 16 E., Salt Lake base and meridian.

Records available.—October 21, 1894, to October 15, 1899; February, 1905, to December 31, 1911.

Drainage area.—38,200 square miles.

Gage.—Chain gage attached to bridge.

Channel.—Somewhat shifting; divided by the highway bridge into three sections, each 168 feet wide.

Discharge measurements.—Formerly made from the railroad bridge and from a near-by ferry; now they may be made from the highway bridge, where measuring conditions are very favorable.

Winter flow.—Ice usually exists at the station during December, January, and February, and affects the relation of gage height to discharge.

Diversions.—The gaging station is located below all important diversions.

Accuracy.—Fair only, owing to shifting character of stream bed.

Cooperation.—Maintained in cooperation with the State of Utah.

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[1] Described in the earlier reports as near "Blake." The name of the post office was later changed to Elgin.

Discharge measurements of Green River near Elgin, Utah, in 1910 and 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
1910.		*Feet.*	*Sec.-ft.*	1911.		*Feet.*	*Sec.-ft.*
Dec. 3	G. H. Canfield.......	5.52	2,280	July 20	J. C. Dort............	6.93	6,280
1911. Mar. 31	G. H. Canfield.......	7.32	5,730	Sept. 16	.....do...............	4.79	1,753
				Oct. 20	.....do...............	5.65	2,940

NOTE.—Considerable angle of current was noted Sept. 16 and Oct. 20, and previous measurements have been reduced accordingly.

The following computations of discharge made in the office for periods from April 1 to December 20, 1911, have been used in connection with the current-meter measurements in constructing the rating curve.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 1-7.....................	7.15	5,260	Oct. 1-9.....................	6.88	5,610
May 1-7.....................	8.46	9,210	Nov. 1-6.....................	5.40	2,580
June 1-7.....................	9.56	13,770	7-11.....................	5.30	2,280
Sept. 17-26.....................	4.63	1,500	Dec. 10-20.....................	4.80	1,640

NOTE.—The measurements recorded for Apr. 1-7, May 1-7, June 1-7, Sept. 17-26, Oct. 1-9, Nov. 1-6, 7-11, and Dec. 10-20 were computed from a study of records at Elgin and the Little Valley stations. The gage heights given are the means of the gage heights for the periods at Elgin station, and the discharges are the means of the computed discharges at the Little Valley station for the same periods, except that the means of the computed discharge for the periods Sept. 18-26 and Nov. 8-12 were used in obtaining mean discharges for the gage-height periods at Elgin.

Daily gage height, in feet, of Green River at Elgin, Utah, for 1911.

[L. H. Greene, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.0	6.85	4.6	7.2	8.05	9.0	9.5	6.2	4.9	6.45	5.4	5.0
2	5.0	7.25	4.8	7.05	8.5	9.35	9.05	6.2	4.9	6.55	5.4	5.0
3	5.0	8.25	5.35	6.95	8.7	9.5	8.9	6.15	4.8	6.8	5.4	4.95
4	5.0	8.3	5.5	6.9	8.7	9.5	8.7	6.1	4.85	6.95	5.4	4.85
5	5.0	8.0	5.75	7.05	8.65	9.6	8.55	5.0	4.9	6.85	5.4	4.8
6	5.0	7.55	5.9	7.35	8.35	9.95	8.45	5.9	5.0	7.05	5.4	4.75
7	5.0	6.95	6.0	7.55	8.3	10.0	8.35	5.8	5.0	7.2	5.3	4.6
8	5.15	6.75	6.2	7.85	8.4	10.0	8.25	5.75	4.9	7.15	5.3	4.7
9	5.25	6.6	7.1	7.95	8.65	10.25	8.1	5.65	4.85	7.0	5.3	4.7
10	5.35	6.3	7.1	7.9	8.95	10.3	8.0	5.55	4.7	6.85	5.3	4.8
11	6.2	6.0	8.5	7.75	9.7	10.45	7.95	5.5	4.7	6.7	5.3	4.8
12	6.55	5.85	9.3	7.55	9.7	10.6	7.9	5.5	4.6	6.55	5.2	4.8
13	6.7	5.75	9.5	7.4	10.05	10.6	7.75	5.4	4.6	6.3	5.2	4.8
14	6.8	5.7	9.2	7.2	9.95	10.6	7.7	5.4	4.6	6.2	5.1	4.8
15	6.35	5.65	8.75	7.2	9.65	10.55	7.65	5.4	4.7	6.05	5.1	4.8
16	5.9	5.6	8.15	7.2	9.45	10.5	7.45	5.3	4.8	6.0	5.05	4.8
17	5.8	5.55	7.75	7.05	9.35	10.5	7.4	5.3	4.7	6.0	5.0	4.8
18	5.85	5.5	7.6	7.0	9.3	10.5	7.3	5.2	4.7	5.9	5.0	4.8
19	6.05	5.4	7.5	6.8	9.3	10.95	7.15	5.2	4.7	5.8	5.0	4.8
20	6.2	5.3	7.5	6.8	9.65	11.3	6.95	5.15	4.6	5.8	5.0	4.8
21	6.2	5.2	7.5	6.6	9.6	11.4	6.85	5.1	4.6	5.7	5.15	4.8
22	6.1	5.15	7.5	6.6	9 6	11.3	6.8	5.1	4.6	5.5	5.25	4.8
23	6.0	5.1	7.5	6.6	9.5	11.3	6.7	5.25	4.6	5.45	5.6	4.8
24	5.85	5.0	7.85	6.6	9.15	11.15	6.75	5.3	4.6	5.4	5.65	4.7
25	5.7	5.0	7.95	6.8	8.7	11.1	6.7	5.2	4.6	5.4	5.6	4.7
26	5.5	4.85	8.0	6.9	8.7	10.85	6.7	5.2	4.6	5.3	5.35	4.6
27	5.5	4.8	7.9	7.35	8.7	10.75	6.6	5.1	5.45	5.3	5.15	4.6
28	5.5	4.8	7.8	7.55	8.8	10.6	6.6	5.1	6.15	5.3	5.0	4.6
29	6.15	....	7.65	7.75	8.95	10.1	6.5	5.0	6.1	5.4	4.8	4.5
30	6.75	....	7.5	7.85	9.05	9.85	6.45	5.0	6.65	5.4	4.95	4.5
31	6.6	....	7.5	....	9.1	....	6.4	5.0	....	5.4	....	4.5

NOTE.—River reported frozen at the gage Jan. 1-16.

Daily discharge, in second-feet, of Green River at Elgin, Utah, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	4,600	1,500	5,390	7,770	11,820	16,400	4,480	2,040	3,950	2,570	1,910
2	....	5,510	1,630	5,045	9,380	12,820	14,240	4,460	2,030	4,180	2,570	1,910
3	....	8,460	2,100	4,820	10,140	13,500	13,520	4,350	1,940	4,740	2,570	1,850
4	....	8,640	2,260	4,710	10,140	13,500	12,610	4,230	1,970	5,160	2,570	1,780
5	....	7,600	2,580	5,045	9,950	13,960	11,950	4,010	2,010	5,000	2,570	1,730
6	....	6,280	2,790	5,760	8,820	15,630	10,515	3,790	2,100	5,630	2,570	1,700
7	....	4,820	2,940	6,280	8,640	15,880	11,085	3,590	2,090	6,110	2,430	1,590
8	....	4,380	3,290	7,130	9,000	15,880	10,660	3,480	1,980	6,120	2,420	1,640
9	....	4,050	5,160	7,440	9,950	17,160	10,050	3,270	1,910	5,890	2,360	1,640
10	....	3,470	5,160	7,280	11,120	17,420	9,670	3,070	1,760	5,450	2,320	1,720
11	....	2,940	9,380	6,835	14,420	18,230	9,490	2,990	1,750	5,050	2,280	1,700
12	....	2,720	12,600	6,280	14,420	19,050	9,310	2,950	1,680	4,770	2,160	1,690
13	....	2,580	13,500	5,890	16,130	19,050	8,790	2,790	1,670	4,050	2,160	1,680
14	....	2,510	12,160	5,390	15,630	19,050	8,620	2,780	1,640	3,840	2,060	1,670
15	....	2,445	10,330	5,390	14,190	18,775	8,455	2,750	1,700	3,520	2,050	1,660
16	....	2,380	8,110	5,390	13,270	18,500	7,810	2,600	1,750	3,440	2,000	1,650
17	2,650	2,320	6,835	5,045	12,820	18,500	7,650	2,590	1,690	3,430	1,970	1,640
18	2,720	2,260	6,410	4,930	12,600	18,500	7,340	2,440	1,690	3,290	1,950	1,640
19	3,025	2,150	6,150	4,490	12,600	20,990	6,880	2,430	1,680	3,130	1,950	1,630
20	3,290	2,050	6,150	4,490	14,190	23,050	6,315	2,360	1,586	2,940	1,940	1,630
21	3,290	1,950	6,150	4,050	13,960	27,600	6,050	2,310	1,570	2,700	2,080	1,630
22	3,110	1,905	6,150	4,050	13,960	26,950	5,920	2,300	1,560	2,690	2,160	1,630
23	2,940	1,860	6,150	4,050	13,500	26,950	5,670	2,460	1,550	2,630	2,590	1,630
24	2,720	1,780	7,130	4,050	11,950	25,975	5,795	2,520	1,540	2,570	2,640	1,560
25	2,510	1,780	7,440	4,490	10,140	25,650	5,670	2,390	1,530	2,570	2,590	1,560
26	2,260	1,665	7,600	4,710	10,140	24,040	5,670	2,380	1,520	2,440	2,250	1,500
27	2,260	1,630	7,280	5,760	10,140	23,405	5,420	2,260	2,240	2,440	2,060	1,500
28	2,260	1,630	6,980	6,280	10,520	22,470	5,420	2,250	3,370	2,440	1,900	1,500
29	3,200	....	6,550	6,835	11,120	19,550	5,180	2,150	3,310	2,570	1,740	1,450
30	4,380	....	6,150	7,130	11,530	18,190	5,065	2,140	4,390	2,570	1,860	1,450
31	4,050	....	6,150	....	11,740	....	4,950	2,130	....	2,570	....	1,450

NOTE.—Daily discharge determined as follows: Jan. 1–10, estimated 1,200 second-feet; Jan. 11–16, estimated 2,600 second-feet; Jan. 17 to June 20, and Dec. 21 to Dec. 31, from a well-defined curve; June 21 to July 31 from a fairly well-defined curve; Aug. 1 to Dec. 20 by indirect method for shifting channels. The curves are partly defined by study of discharge data at Little Valley (7 miles below Elgin) during 1911.

Monthly discharge of Green River at Elgin, Utah, for 1911.

[Drainage area, 38,200 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	2,330	143,000	D.
February	8,640	1,630	3,440	191,000	B.
March	13,500	1,500	6,280	386,000	B.
April	7,440	4,050	5,480	326,000	B.
May	16,130	7,770	11,700	719,000	B.
June	27,600	11,820	19,400	1,150,000	A.
July	16,400	4,950	8,460	520,000	B.
August	4,480	2,130	2,930	180,000	B.
September	4,390	1,520	1,970	117,000	B.
October	6,120	2,440	3,800	234,000	B.
November	2,640	1,740	2,240	133,000	B.
December	1,910	1,450	1,640	101,000	B.
The year	27,600	....	5,810	4,200,000	

GREEN RIVER AT LITTLE VALLEY, NEAR GREEN RIVER, UTAH.

Location.—At Little Valley Ferry, 4 miles downstream from Green River railroad station (7 miles by wagon road) in sec. 5, T. 22 S., R. 16 E., Salt Lake meridian.

Records available.—December 18, 1910, to December 31, 1911.

Drainage area.—Not accurately known.

Gage.—Staff, in four sections—three inclined and one vertical.

Channel.—Shifts at measuring section; fairly permanent at control.

Discharge measurements.—Made from car on ferry cable.

Winter flow.—Ice affects relation of gage height to discharge for periods during the months of December, January, and February.

Diversions.—Below all important diversions.

Accuracy.—Gage height data for 1911 are unreliable for first three months and fragmentary for the rest of the year. For this reason and as there is a complete and reliable record available at Elgin (only 6 miles by river above Little Valley) no estimates are published for 1911. Engineers and others interested are referred to the record at the Elgin station for 1911.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Green River at Little Valley, near Green River, Utah, for 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 2	J. C. Dort	2.53	4,890
July 21	.....do	2.98	6,110
Sept. 17	.....do	.50	1,670
Oct. 20	.....do	[a]1.45	3,080

[a] Gage height for measurement made Oct. 20 unreliable, as the relation between a temporary gage and a permanent gage was determined by the gage reader.

COLORADO RIVER AT YUMA, ARIZ.

Location.—At Southern Pacific Co.'s railroad bridge at Yuma, in sec. 35, T. 16 S., R. 22 E., San Bernardino base and meridian, about 1½ miles below mouth of Gila River.

Records available.—April 1, 1878, to December 31, 1911.

Drainage area.—225,000 square miles.

Gage.—Vertical staff in two sections at the bridge; the zero of the gage is 102.79 feet above sea level.

Channel.—Shifting sand.

Discharge measurements.—Made from car and cable 600 feet below the gage.

Diversions.—Water is diverted for irrigation and power development above the station.

Accuracy.—Results are considered good.

Cooperation.—Complete record is furnished by the United States Reclamation Service through F. L. Sellew, project engineer.

Discharge measurements of Colorado River at Yuma, Ariz., in 1911.

[By G. D. Thompkins and B. R. Cloyd.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 3	15.80	5,430	Jan. 19	17.20	12,830
5	15.80	4,960	21	17.80	15,460
7	15.70	4,750	24	17.00	11,580
11	15.00	4,820	26	17.00	11,080
14	16.10	6,510	28	16.70	9,840
17	16.00	7,130	31	17.00	10,560

Discharge measurements of Colorado River at Yuma, Ariz., in 1911—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Feb. 2	16.70	9,360	Aug. 5	19.20	28,630
4	17.30	11,310	8	18.10	22,190
7	19.30	22,260	10	18.00	18,180
9	18.50	16,990	12	18.10	17,800
11	19.90	24,920	15	17.80	13,850
14	18.30	16,560	17	17.60	12,830
16	17.60	13,320	19	17.50	12,800
18	17.00	10,680	22	17.05	11,400
23	16.10	9,330	24	17.10	11,400
25	16.50	7,920	26	17.10	10,970
28	16.50	7,450	29	17.45	11,400
Mar. 2	16.60	7,590	31	18.55	17,200
4	16.40	7,000	Sept. 2	17.60	12,000
7	16.20	6,590	5	17.70	12,000
9	18.20	17,780	7	17.10	10,600
11	17.70	12,600	9	16.60	8,300
14	21.40	34,900	12	16.35	7,300
16	19.30	21,630	14	16.60	7,800
18	19.70	24,700	16	16.55	7,300
23	19.10	21,150	19	16.35	6,600
25	18.50	17,600	21	17.60	10,100
28	18.20	16,670	23	16.80	8,300
30	18.30	16,950	26	16.60	7,500
Apr. 1	18.60	17,430	28	18.00	14,200
4	18.80	18,180	30	16.80	8,700
8	18.80	19,900	Oct. 3	16.60	8,000
11	19.40	22,370	5	18.65	22,400
13	19.70	24,860	7	21.05	37,600
15	19.70	24,960	10	21.55	40,100
20	18.90	19,610	12	22.80	49,400
22	18.70	18,410	14	24.00	59,600
25	18.50	17,780	17	20.10	34,700
27	18.60	19,040	19	18.95	26,800
29	19.10	21,900	21	18.15	22,200
May 2	20.00	27,420	24	17.30	18,200
6	20.95	32,780	26	17.10	15,600
9	20.80	32,280	28	17.10	15,200
11	20.90	30,820	31	17.05	14,000
16	22.80	49,540	Nov. 2	17.10	13,200
18	23.50	55,100	4	18.10	18,300
20	23.90	64,200	7	17.65	15,100
23	23.30	54,750	9	17.20	13,300
25	23.00	54,790	11	17.10	12,700
27	23.20	58,750	14	17.00	11,600
June 1	22.20	50,310	16	16.90	11,100
3	22.50	51,330	18	16.90	10,000
6	22.60	53,810	21	17.00	10,700
10	23.20	56,540	23	17.00	9,400
13	23.80	63,180	25	16.90	9,300
15	24.00	66,540	28	17.00	9,600
22	25.45	70,650	30	17.00	9,500
24	25.85	78,300	Dec. 2	17.10	10,100
July 1	24.70	69,540	5	17.15	10,000
5	23.20	57,300	7	17.00	8,300
8	21.65	50,250	9	16.85	7,700
11	22.10	53,880	12	16.20	5,800
13	21.35	50,220	14	16.15	5,600
15	20.90	44,190	16	16.65	6,900
17	20.20	38,490	19	17.20	8,000
20	20.90	42,610	21	17.00	7,700
22	21.15	42,610	23	16.80	7,600
25	21.55	47,740	26	16.65	6,800
27	22.75	55,290	28	16.70	6,900
29	22.20	51,230	28	16.70	6,900
Aug. 1	21.45	46,070	30	16.70	6,900
3	20.40	36,030			

Daily gage height, in feet, of Colorado River at Yuma, Ariz., for 1911.

[G. D. Tompkins and B. R. Cloyd, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	16.15	16.85	16.65	18.55	19.9	22.2	24.6	21.5	17.9	16.75	17.0	17.05
2	15.7	16.75	16.5	18.8	20.0	22.35	24.4	20.95	17.55	16.6	17.1	17.1
3	15.8	17.15	16.4	18.85	20.0	22.5	24.25	20.3	17.6	17.65	17.45	17.05
4	15.8	17.45	16.4	18.8	20.15	22.6	23.8	19.7	17.6	18.9	18.2	17.1
5	15.75	18.1	16.4	18.65	20.4	22.65	22.9	19.2	17.7	18.95	18.1	17.1
6	15.7	17.9	16.3	19.0	20.9	22.6	22.0	18.8	17.3	20.6	17.75	17.1
7	15.7	19.6	16.2	18.6	21.2	22.8	21.6	18.35	17.05	21.05	17.6	17.0
8	15.7	19.25	16.2	19.0	21.05	22.9	21.7	18.1	16.8	21.0	17.4	16.95
9	15.4	18.45	18.3	18.9	20.9	23.0	22.0	17.85	16.6	21.1	17.2	17.05
10	15.0	18.6	18.5	19.25	21.0	23.25	22.2	18.0	16.5	21.65	17.2	16.55
11	15.0	20.0	17.65	19.35	20.85	23.5	22.05	18.15	16.4	22.35	17.1	16.3
12	15.1	19.35	18.0	19.55	21.2	23.55	21.6	18.1	16.45	22.9	17.05	16.15
13	16.0	18.7	20.0	19.75	21.5	23.8	21.3	18.15	16.45	23.5	17.0	16.15
14	15.95	18.25	21.35	19.85	21.85	23.9	21.1	18.0	16.6	24.1	17.0	16.15
15	17.45	17.8	19.95	19.7	22.25	24.05	20.95	17.8	16.55	23.75	16.9	16.45
16	16.7	17.55	19.25	19.45	22.9	24.3	20.35	17.65	16.55	21.45	16.9	16.6
17	15.95	17.4	19.45	19.25	23.3	24.4	20.2	17.55	16.45	20.0	16.95	16.8
18	15.9	17.0	19.85	19.13	23.6	24.75	20.4	17.5	16.5	19.3	16.95	17.1
19	17.3	16.7	20.5	18.9	23.9	24.75	20.35	17.5	16.35	18.9	17.05	17.2
20	18.0	16.6	20.3	18.9	23.9	25.05	20.8	17.5	16.6	18.45	17.05	17.0
21	17.75	16.55	20.05	18.8	23.75	25.25	20.9	17.25	17.5	18.1	17.0	17.0
22	17.55	16.45	19.6	18.65	23.4	25.45	21.15	17.05	17.0	17.7	17.05	17.0
23	17.3	16.3	19.0	18.4	23.15	25.6	21.25	17.0	16.75	17.4	17.05	16.8
24	16.9	16.5	18.6	18.3	23.0	25.85	21.0	17.1	16.6	17.35	17.1	16.8
25	16.8	16.5	18.4	18.5	23.0	26.65	21.15	17.1	16.6	17.25	16.9	16.6
26	17.0	16.35	18.2	18.6	23.2	26.45	22.4	17.05	16.6	17.1	17.0	16.65
27	16.85	16.5	18.1	18.65	23.2	26.25	22.85	17.05	17.25	17.0	17.0	16.8
28	16.7	16.55	18.0	18.9	23.3	24.95	22.55	17.25	17.8	17.15	17.0	16.7
29	16.9	....	18.2	19.2	23.15	24.8	22.2	17.45	17.05	17.35	17.0	16.6
30	17.3	....	18.3	19.55	22.6	24.7	22.75	18.0	16.75	17.15	17.05	16.7
31	16.95	....	18.4	....	22.4	....	21.95	18.45	....	17.05	....	16.45

Daily discharge, in second-feet, of Colorado River at Yuma, Ariz., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,500	9,900	8,100	17,000	27,000	50,300	69,000	46,500	13,300	8,500	13,000	9,800
2	4,800	9,700	7,800	18,800	27,400	50,900	67,000	41,300	11,700	7,800	13,200	10,100
3	5,400	11,300	7,300	18,900	27,100	51,300	65,500	35,300	11,800	15,500	16,200	9,700
4	5,200	12,400	7,000	18,200	27,800	53,000	61,900	31,500	11,500	25,200	19,200	9,800
5	4,700	16,200	7,200	17,200	29,100	52,900	55,200	28,600	12,000	24,500	18,600	9,500
6	4,600	12,300	6,900	20,600	32,500	53,800	48,800	26,300	10,500	36,000	15,800	9,300
7	4,700	24,300	6,600	17,800	34,700	54,900	46,500	23,500	10,300	37,600	14,600	8,300
8	5,500	22,200	6,100	21,500	33,500	55,200	50,700	22,200	9,100	36,500	14,000	8,100
9	4,800	16,500	18,200	20,000	32,300	55,500	53,400	18,600	8,300	36,700	13,300	8,900
10	3,700	15,900	19,800	22,000	32,400	56,900	54,600	18,200	7,800	41,300	13,300	6,700
11	4,300	25,700	12,300	22,000	30,400	59,500	53,500	18,800	7,500	46,800	12,700	5,900
12	3,800	22,100	12,200	23,600	34,000	60,700	50,800	17,800	7,900	50,500	12,200	5,500
13	7,100	18,300	26,400	25,200	37,000	63,200	49,700	17,800	7,400	55,200	11,700	5,600
14	5,800	16,100	34,500	25,900	40,000	64,900	46,900	16,000	7,800	60,200	11,700	5,600
15	16,300	13,700	25,500	25,000	44,000	67,900	44,700	13,800	7,400	58,900	11,100	6,500
16	10,900	13,000	21,500	23,300	50,500	67,900	39,000	12,800	7,300	43,500	11,100	6,700
17	7,000	12,800	22,800	21,900	53,600	67,800	38,500	12,000	6,900	33,800	11,000	7,100
18	6,100	10,700	25,700	20,900	55.800	69,200	39,500	12,200	7,300	29,100	10,400	8,100
19	13,700	9,700	30,500	19,500	61,000	68,500	37,800	12,800	6,600	26,800	11,000	8,000
20	18,700	9,800	29,200	19,600	64,200	69,600	41,500	13,500	6,300	23,800	11,000	7,300
21	15,100	10,500	27,500	19,000	61,300	70,200	41,200	12,300	9,500	21,800	10,700	7,700
22	14,500	10,700	24,500	18,000	57,100	70,600	42,600	11,400	8,000	19,600	10,400	8,100
23	13,300	10,600	20,400	16,100	53,700	74,100	44,000	10,900	8,000	18,000	9,800	7,600
24	10.900	9,800	17,700	15,600	53,800	78,300	41,200	11,400	7,300	18,700	10,400	7,500
25	10,000	7,900	16,700	17,800	54,800	76,800	49,800	11,200	7,400	17,200	9,300	6,600
26	11,100	7,000	15,500	18,800	57,600	75,300	53,700	11,000	7,500	15,600	9,800	6,800
27	10,500	7,600	15,200	19,400	58,800	73,900	56,000	10,000	10,500	14,600	9,700	7,600
28	9,800	7,700	15,000	20,800	59,100	71,800	53,900	10,700	12,600	15,500	9,600	6,900
29	10,700	....	16,500	22,700	57,800	70,500	51,200	11,400	9,200	17,300	9,600	6,500
30	13,200	....	17,000	24,800	53,700	69,800	56,100	14,400	8,700	15,200	9,800	6,900
31	10,300	....	16,700	....	52,000	....	50,400	16,500	....	14,000	....	5,800

Monthly discharge of Colorado River at Yuma, Ariz., for 1911.

[Drainage area, 225,000 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	18,700	3,700	8,800	0.039	0.045	541,487
February	25,700	7,000	13,400	.059	.062	742,610
March	34,500	6,100	17,400	.077	.089	1,067,700
April	25,900	15,600	20,400	.091	.101	1,213,685
May	64,200	27,000	45,000	.200	.231	2,764,960
June	78,800	50,300	64,200	.285	.318	3,818,576
July	69,000	37,800	50,100	.223	.257	3,083,549
August	46,500	10,000	18,400	.082	.095	1,131,983
September	13,300	6,300	8,900	.040	.045	530,388
October	60,200	7,800	28,600	.126	.144	1,756,786
November	19,200	9,300	12,140	.054	.060	722,391
December	10,100	5,500	7,600	.034	.039	465,130
The year	78,800	3,700	24,600	.109	1.486	17,839,245

TRIBUTARY BASINS.

NEW FORK RIVER BASIN.

NEW FORK RIVER NEAR CORA, WYO.

Location.—At Alexander's ranch in sec. 29, T. 36 N., R. 110 W., 3½ miles below the outlet of New Fork Lake and 10 miles northwest of Cora post office.

Records available.—July 29, 1910, to September 30, 1911. From May 23 to August 31, 1905, a station described under the same name was maintained 12 miles below the present site. The records at the two points are not comparable, as several tributaries enter between and several diversions are made.

Drainage area.—Not measured.

Gage.—Vertical staff; datum was raised 7.12 feet September 23, 1910; all readings refer to the present datum.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Diversions and storage.—The natural storage afforded by New Fork Lake and other lakes in the basin gives the New Fork a fairly uniform flow. New Fork Lake will probably be used for storage in connection with irrigation. Only one small ditch takes out above the station.

Winter flow.—Ice causes backwater during the winter months.

Accuracy.—Owing to insufficient data no estimates of discharge are available.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of New Fork River near Cora, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 23	Wimmer and Belknap	1.68	39.5
Aug. 1	G. E. Belknap	1.90	69.7
Sept. 17	do	1.30	17.4

Daily gage height, in feet, of New Fork River near Cora, Wyo., for 1911.

[Eugene Alexander, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.7	1.4	1.3	1.3	1.4	1.8	2.7	1.9	1.4
2	1.6	1.4	1.3	1.3	1.4	1.9	2.6	1.9	1.4
3	1.7	1.3	1.3	1.3	1.4	1.9	2.5	1.85	1.4
4	1.9	1.4	1.2	1.3	1.4	1.9	2.5	1.8	1.4
5	2.0	1.4	1.2	1.3	1.4	2.0	2.55	1.8	1.4
6	1.9	1.4	1.2	1.3	1.4	2.1	2.6	1.8	1.4
7	1.7	1.4	1.3	1.3	1.4	2.2	2.6	1.75	1.4
8	1.5	1.4	1.3	1.3	1.4	2.35	2.7	1.7	1.4
9	1.4	1.4	1.3	1.3	1.5	2.45	2.6	1.7	1.4
10	1.4	1.4	1.3	1.3	1.5	2.5	2.5	1.7	1.4
11	1.4	1.4	1.3	1.3	1.5	2.5	2.45	1.7	1.4
12	1.4	1.4	1.3	1.3	1.5	2.65	2.4	1.7	1.4
13	1.3	1.4	1.3	1.3	1.5	2.85	2.35	1.7	1.4
14	1.3	1.4	1.3	1.3	1.6	3.05	2.3	1.7	1.4
15	1.2	1.4	1.3	1.3	1.6	3.1	2.3	1.7	1.4
16	1.2	1.3	1.3	1.3	1.6	3.35	2.3	1.7	1.4
17	1.3	1.3	1.3	1.3	1.6	3.4	2.3	1.7	1.4
18	1.3	1.3	1.3	1.3	1.7	3.4	2.3	1.7	1.4
19	1.2	1.3	1.3	1.3	1.7	3.35	2.3	1.6	1.4
20	1.2	1.3	1.3	1.3	1.7	3.25	2.25	1.6	1.4
21	1.2	1.3	1.3	1.3	1.7	3.25	2.2	1.6	1.3
22	1.2	1.3	1.3	1.3	1.7	3.3	2.2	1.6	1.3
23	1.2	1.3	1.3	1.4	1.7	3.25	2.15	1.6	1.3
24	1.3	1.3	1.3	1.4	1.7	3.15	2.1	1.5	1.3
25	1.2	1.3	1.2	1.4	1.7	2.95	2.1	1.5	1.3
26	1.3	1.3	1.3	1.4	1.7	2.85	2.05	1.5	1.3
27	1.4	1.3	1.3	1.4	1.8	2.75	2.0	1.5	1.3
28	1.4	1.3	1.3	1.4	1.8	2.7	2.0	1.5	1.3
29	1.3	....	1.3	1.4	1.8	2.7	1.95	1.5	1.4
30	1.3	....	1.3	1.4	1.8	2.7	1.9	1.5	1.4
31	1.4	....	1.3	....	1.8	....	1.9	1.4	....

NOTE.—From Jan. 1 to Apr. 10 gage heights were affected by ice; average thickness of ice in January, 1.2 feet; in February, 1.2 feet; in March, 0.9 foot; from Apr. 1 to 10, 0.6 foot.

PINE CREEK NEAR PINEDALE, WYO.

Location.—At an old Indian ford in sec. 22, T. 34 N., R. 109 W., one-third mile below the outlet of Fremont Lake and 4½ miles north of Pinedale post office.

Records available.—July 22, 1910, to December 16, 1911. From April 2, 1905, to October 31, 1906, a station described under the same name was maintained one-half mile below the present station. The records at the two points are not comparable, as two ditches divert water between the two.

Drainage area.—130 square miles (measured from Land Office map).

Gage.—Chain gage; datum was raised 0.63 foot September 20, 1910; all readings have been referred to the present datum.

Channel.—Apparently permanent.

Discharge measurements.—Made from car and cable during high water and by wading during ordinary stages.

Storage.—The natural storage afforded by Fremont Lake gives Pine Creek a fairly uniform flow.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 77 second-feet from Pine Creek. One ditch takes water above the station.

Accuracy.—On account of the scattering gage heights the records can not be considered better than fair.

Winter flow.—Ice causes backwater at the station, and the records are discontinued during the winter months.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Pine Creek near Pinedale, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 23	G. E. Belknap	1.60	28.6	June 26	G. E. Belknap	4.40	1,470
May 22	Wimmer and Belknap	2.00	99.3	July 29	Belknap and Hall	2.70	372
22	G. E. Belknap	2.00	95.0				

Daily gage height, in feet, of Pine Creek near Pinedale, Wyo., for 1911.

[Geo. E. Belknap, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.6	1.6							
2	1.6					2.0			
3	1.6								1.8
4	1.6	1.65							
5	1.6	1.7		3.8	2.4	1.9		1.7	
6	1.6	1.7							1.7
7	1.6	1.7	2.7				1.8		1.7
8	1.6	1.7	2.7		2.4				
9	1.6					1.8			
10	1.6		2.9						1.75
11	1.7		3.0					1.7	
12	1.6		3.15						1.6
13	1.6		3.4				1.9		
14		1.8	3.6						1.6
15	1.6		3.8	3.7					
16	1.6		4.0		2.1	1.7		1.8	1.6
17	1.6		4.3		2.1		1.8	1.8	
18	1.6		4.4						
19	1.6		4.5						
20	1.6								
21	1.7	1.9						1.8	
22	1.6	2.0							
23	1.6	2.0				1.7		1.8	
24	1.6		4.6	3.6	2.1		1.8		
25	1.6								
26	1.6		4.4						
27	1.6		4.2						
28	1.6	2.3	4.1						
29	1.6								
30	1.6		4.0		2.0	1.7	1.8	1.8	
31				3.6					

NOTE.—Nov. 16 to Dec. 31 gage readings affected by ice.

Daily discharge, in second-feet, of Pine Creek near Pinedale, Wyo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	29	29	266	1,150	778	97	45	
2	29	32	285	1,130	641	97	48	
3	29	34	304	1,100	504	90	50	
4	29	36	323	1,070	367	83	52	
5	29	42	342	1,040	230	76	54	42
6	29	42	361	1,030	230	72	56	
7	29	42	380	1,030	230	68	58	
8	29	42	380	1,020	230	63	61	
9	29	45	432	1,020	217	58	64	
10	29	48	485	1,010	204	56	67	
11	42	51	540	1,000	191	54	70	42
12	29	54	630	998	178	52	73	
13	29	56	785	992	164	50	76	
14	29	58	915	986	150	48	72	
15	29	61	1,040	980	136	45	68	

Daily discharge, in second-feet, of Pine Creek near Pinedale, Wyo., for 1911—Contd.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16	29	64	1,180	973	123	42	63	....
17	29	67	1,400	966	123	42	58	....
18	29	70	1,480	959	123	42	58	....
19	29	72	1,550	952	123	42	58	....
20	29	74	1,560	945	123	42	58	....
21	42	76	1,580	938	123	42	58	....
22	29	97	1,600	931	123	42	58	....
23	29	97	1,610	923	123	42	58	....
24	29	115	1,620	915	123	42	58	....
25	29	133	1,550	915	119	42	58	....
26	29	151	1,480	915	115	42	58	....
27	29	170	1,320	915	111	42	58	....
28	29	188	1,250	915	107	42	58	....
29	29	208	1,120	915	102	42	58	....
30	29	228	1,180	915	97	42	58	....
31	....	247	....	915	97	....	58	....

NOTE.—Daily discharge determined from a fairly well-defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Pine Creek near Pinedale, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	42	29	29.9	1,780	C.
May	247	29	88.0	5,410	C.
June	1,620	266	965	57,400	C.
July	1,150	915	983	60,400	C.
August	778	97	203	12,500	C.
September	97	42	54.6	3,250	C.
October	76	45	59.6	3,660	C.
November	....	....	[a] 40.0	2,380	D.
The period	....	....	....	147,000	

[a] Estimated.

BIG SANDY CREEK BASIN.

BIG SANDY CREEK NEAR BIG SANDY, WYO.

Location.—At Leckie's ranch, in sec. 18, T. 30 N., R. 104 W., about 4 miles east of Big Sandy post office, Wyo.; below all mountain tributaries.

Records available.—July 26, 1910, to August 31, 1911.

Drainage area.—Not measured.

Gage.—Chain gage installed September 27, 1910. All data for 1910 derived from readings on a staff gage referred to a different datum.

Channel.—Apparently permanent.

Discharge measurements.—Made from car and cable during high water and by wading at ordinary stages.

Diversions and storage.—The Eden Irrigation Co., which has a project in T. 26 N., R. 105 W., is building a reservoir at the present gaging station site. Prior to July 1, 1912, there were adjudicated diversions from Big Sandy River of 37 second-feet. It is not known what portion of this is above the station.

Accuracy.—Owing to the meager data the records can not be considered better than fair.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Big Sandy Creek near Big Sandy, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 18	Schmehl and Wimmer	6.21	154
19	....do	6.08	143
Aug. 4	W. T. Schmehl	5.20	61

Daily gage height, in feet, and discharge, in second-feet, of Big Sandy Creek near Big Sandy, Wyo., for 1911.

[Mrs. Annie Leckie, observer.]

Day.	May.		June.		July.		August.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	....	82	6.7	208	7.0	241	5.3	68
2	5.45	82	6.8	219	6.6	197	5.25	64
3	5.5	86	6.9	230	6.5	186	5.2	60
4	....	110	7.2	264	6.55	192	5.2	60
5	6.0	133	7.3	276	6.9	230	....	68
6	5.8	113	7.4	288	6.55	192	5.4	77
7	6.0	133	7.6	312	....	194	5.35	72
8	5.9	123	7.5	300	6.6	197	5.2	60
9	....	133	7.6	312	....	191	5.2	60
10	6.1	143	7.9	348	....	185	5.2	60
11	....	154	7.9	348	....	178	5.2	60
12	....	164	8.3	396	....	171	5.2	60
13	6.4	175	8.1	372	6.3	164	5.2	60
14	....	180	7.9	348	....	158	5.2	60
15	6.5	186	....	372	6.2	153	5.2	60
16	6.5	186	8.3	396	6.2	153	5.2	60
17	6.35	170	8.2	384	6.0	133	5.3	68
18	6.25	158	....	336	6.0	133	5.3	68
19	6.3	164	7.4	288	6.0	133	5.3	68
20	6.0	133	7.4	288	6.0	133	5.2	60
21	6.2	153	7.6	312	5.9	123	5.2	60
22	6.2	153	7.4	288	5.8	113	5.1	52
23	6.35	170	7.3	276	5.8	113	5.1	52
24	6.4	175	7.0	241	5.75	108	5.1	52
25	6.7	208	7.0	241	5.7	104	5.1	52
26	6.7	208	....	230	5.6	95	....	52
27	6.5	186	6.8	219	5.6	95	....	52
28	6.4	175	6.8	219	5.45	82	5.1	52
29	6.5	186	6.8	219	5.4	77	5.1	52
30	6.7	208	6.8	219	5.35	72	5.1	52
31	6.7	208	....	....	5.3	68	5.1	52

NOTE.—Daily discharge determined from a poorly defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Big Sandy Creek near Big Sandy, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	208	82	168	10,300	C.
June	396	208	292	17,400	C.
July	241	68	147	9,040	C.
August	77	52	59.8	3,680	C.

BIG SANDY CREEK NEAR EDEN, WYO.

Location.—At Poston's ranch, above point of diversion for the Eden canal, in T. 28 N., R. 106 W., near Eden, Wyo.

Records available.—April 28 to October 7, 1911.

Drainage area.—Not measured.

Channel.—Shifting.

Discharge measurements.—Made from wagon bridge.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 37 second-feet from Big Sandy River.

Accuracy.—Results are fairly accurate.

Cooperation.—Station maintained in cooperation with the Eden Irrigation & Land Co.

Discharge measurements of Big Sandy Creek near Eden, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 28	W. E. Robertson	1.03	450
June 21	.....do	4.33	583
July 7	.....do	2.33	252

Daily gage height, in feet, of Big Sandy Creek near Eden, Wyo., for 1911.

[W. E. Robertson, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	1.0	2.9	3.9	1.3	0.8	1.1
2	....	.9	3.0	2.5	1.3	.8	1.4
3	....	1.0	3.1	2.4	1.3	.8	1.5
4	....	1.1	3.4	2.5	1.2	.9	1.5
5	....	1.0	3.7	2.3	1.1	.9	1.5
6	....	1.6	3.8	2.4	1.2	.9	1.4
7	....	1.5	3.9	2.33	1.2	.9	1.4
8	....	1.5	4.0	2.4	1.2	1.0	....
9	....	1.6	4.0	2.4	1.1	1.0	....
10	....	1.7	3.3	2.1	1.1	.9	....
11	....	1.7	3.2	2.0	1.0	.9	....
12	....	2.0	4.0	1.8	1.0	1.0	....
13	....	2.1	4.3	1.8	1.0	.9	....
14	....	2.0	5.0	1.8	1.0	.9	....
15	....	2.1	5.1	1.8	1.0	.9	....
16	....	2.3	5.4	1.7	1.0	.9	....
17	....	2.3	4.6	1.6	1.0	.9	....
18	....	2.2	....	1.8	1.0	.9	....
19	....	1.8	....	1.7	1.0	.9	....
20	....	1.7	....	1.6	1.0	.9	....
21	....	1.7	4.33	1.6	.9	.8	....
22	....	1.9	....	1.5	.9	.8	....
23	....	2.0	4.2	1.4	1.0	.9	....
24	....	2.5	4.2	1.4	.9	....	....
25	....	2.6	4.1	1.4	.9	.9	....
26	....	2.4	4.0	1.5	.9	.9	....
27	....	2.1	4.0	1.5	.9	1.0	....
28	1.03	2.2	3.8	1.4	.9	1.0	....
29	1.0	2.1	3.7	1.4	.9	1.1	....
30	1.0	2.0	3.9	1.3	.8	1.1	....
31	....	2.6	....	1.3	.8	....	....

Daily discharge, in second-feet, of Big Sandy Creek near Eden, Wyo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	41	342	510	86	13	56
2	....	27	358	278	86	13	102
3	....	41	374	262	86	13	118
4	....	56	424	278	71	27	118
5	....	41	475	246	56	27	118
6	....	134	492	262	71	27	102
7	....	118	510	251	71	27	102
8	....	118	528	262	71	41	....
9	....	134	528	262	56	41	....
10	....	150	407	214	56	27	....
11	....	150	390	198	41	27	....
12	....	198	528	166	41	41	....
13	....	214	582	166	41	27	....
14	....	198	725	166	41	27	....
15	....	214	748	166	41	27	....
16	....	246	818	150	41	27	....
17	....	246	640	134	41	27	....
18	....	230	629	166	41	27	....
19	....	166	615	150	41	27	....
20	....	150	601	134	41	27	....
21	....	150	587	134	27	13	....
22	....	182	576	118	27	13	....
23	....	198	564	102	41	27	....
24	....	278	564	102	27	27	....
25	....	294	546	102	27	27	....
26	....	262	528	118	27	27	....
27	....	214	528	118	27	41	....
28	45	230	492	102	27	41	....
29	41	214	475	102	27	56	....
30	41	198	510	86	13	56	....
31	....	294	....	86	13	....	....

NOTE.—Daily discharge determined from a fairly well defined rating curve; discharge interpolated for days for which gage heights are missing.

Monthly discharge of Big Sandy Creek near Eden, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April (28-30)	45	41	42.3	252	C.
May	294	27	174	10,700	C.
June	818	342	536	31,900	C.
July	510	86	180	11,100	C.
August	86	13	45.3	2,790	C.
September	56	13	28.9	1,720	C.
October (1-7)	118	56	102	1,420	C.
The period	....	....	....	59,900	

DUTCH JOE CREEK NEAR BIG SANDY, WYO.

Location.—Half a mile west of Dutch Joe ranger station, in sec. 4, T. 30 N., R. 104 W., 2 miles above the junction of Dutch Joe Creek with Squaw Creek; no tributaries below the station.

Records available.—May 17 to November 6, 1911.

Drainage area.—17 square miles (measured from Forest Service atlas).

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Diversions.—No water is diverted above the station. Prior to July 1, 1912, there was an adjudicated diversion of 2 second-feet below.

Winter flow.—Ice causes backwater at the station, and the records are discontinued during the winter months.

Accuracy.—As the station has not yet been completely rated estimates of discharge can not be presented.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Dutch Joe Creek near Big Sandy, Wyo., for 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 17	O. M. Wimmer	0.90	35.7
18	....do	.80	22.7
Aug. 1	W. T. Schmehl	.59	11.5

Daily gage height, in feet, of Dutch Joe Creek near Big Sandy, Wyo., for 1911.

[W. G. Schmehl, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		1.35	1.35	0.59	0.28		0.40
2		1.35	1.10	.59	.25		.35
3		1.32	1.00	.55	.30		.32
4		1.60	1.00	.55	.30	0.60	.30
5		1.56	1.20	.55	.40	.62	.25
6		1.90	1.00	.50	.50	.59	.34
7		2.05	1.00	.50	.49	.60	
8		2.00	1.10	.50	.40	.55	
9		1.60	.90	.50	.40	.55	
10		1.50	.90	.48	.40	.60	
11		1.80	.85	.50			
12		2.35	.88	.48			
13		2.60	.80	.50	.40	.30	
14		2.25	.80	.45	.50	.30	
15		2.30	.84	.44	.40	.30	
16		2.80	.90	.42	.40	.40	
17	0.90	2.30	.80	.40	.38	.40	
18	.80	1.80	.80	.40	.35	.37	
19	.78	1.60	.85	.40	.36	.42	
20	.71	1.75	.80	.39	.35	.43	
21	.64	2.50	.80	.37	.35	.58	
22	.84	1.60	.80	.32	.40	.40	
23	.95	1.60	.75	.30	.41		
24	.98	1.60	.75	.30	.40	.46	
25	1.10	1.45	.73	.30	.45		
26	1.14	1.45	.75	.30	.50	.45	
27	1.00	1.35	.70	.29	.52	.40	
28	.95	1.35	.70	.30	.60		
29	.88	1.30	.70	.30	.59	.51	
30	.96	1.40	.65	.30			
31	1.20		.60	.30		.25	

NOTE.—Gage heights Oct. 31 to Nov. 6 affected by ice.

SQUAW CREEK NEAR BIG SANDY, WYO.

Location.—At Dutch Joe ranger station, 1 mile above the mouth of Dutch Joe Creek and 1½ miles above the junction of Squaw Creek and Big Sandy River.

Records available.—May 17 to November 8, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Apparently permanent although the data are not conclusive.

Discharge measurements.—Made from footbridge during high water and by wading at ordinary stages.

Diversions.—No water is diverted above the station.

Winter flow.—Ice causes backwater, and the records are discontinued during the winter months.

Accuracy.—Owing to meager data the results can not be considered better than fair.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Squaw Creek near Big Sandy, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 17	Schmehl and Wimmer	0.70	41.8
19	.....do	.60	30.1
Aug. 9	W. T. Schmehl	.24	12.5

Daily gage height, in feet, of Squaw Creek near Big Sandy, Wyo., for 1911.

[W. T. Schmehl, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1					0.05		0.15
2				0.30			
3					.06		
4		0.90		.30			
5		.95					
6		.90				0.25	
7			0.60				
8			.60		.15	.30	.10
9			.80	.24		.28	
10		.88		.25	.10		
11							
12		1.00					
13			.75				
14		.85					
15					.10		
16		1.20				.10	
17	0.70	1.00	.45	.15	.06	.11	
18	.65	.98					
19	.58	.95		.13			
20		1.00	.45				
21	.74			.10	.05		
22	.80			.10			
23	.75	.94	.40			.10	
24	.73				.10		
25		.80			.17		
26		.80				.10	
27	.73	.78	.35				
28	.75	.78					
29		.75					
30	.78						
31	.80						

NOTE.—Ice present from Oct. 16 to Nov. 8.

Daily discharge, in second-feet, of Squaw Creek near Big Sandy, Wyo., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.
1		54	42	14	8	11
2		57	40	14	8	12
3		60	38	14	8.2	12
4		63	36	14	8.5	12
5		69	34	14	8.8	12
6		63	32	13	9.2	12
7		63	31	13	9.6	13
8		62	31	12	10	14
9		62	51	12	10	13
10		61	50	12	9	
11		68	48	12	9	
12		75	47	12	9	
13		66	46	11	9	
14		57	40	11	9	
15		79	34	10	9	
16		101	28	10	8.6	
17	40	75	21	10	8.2	
18	36	73	21	10	8.2	
19	30	69	21	10	8.1	
20	37	75	21	10	8.	
21	44	72	20	9	8	
22	51	70	19	9	8	
23	46	68	18	9	9	
24	43	60	18	9	9	
25	43	51	17	9	10	
26	43	51	16	9	10	
27	43	49	16	8	10	
28	46	49	16	8	10	
29	48	46	15	8	11	
30	49	44	15	8	11	
31	51		14	8		

NOTE.—Daily discharge determined from a poorly defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Squaw Creek near Big Sandy, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 17-31			43.3	1,290	C.
June	101	44	63.7	3,790	C.
July	51	14	28.9	1,780	C.
August	14	8	10.7	658	C.
September	10	8	9.05	539	C.
October 1-9	14		12.3	219	C.
The period				8,280	

LITTLE SANDY CREEK NEAR EDEN, WYO.

Location.—At the highway bridge about one-fourth mile above the mouth of the stream, in sec. 34, T. 25 N., R. 106 W., near Eden, Wyo.

Records available.—April 25 to October 31, 1911.

Channel.—Slightly shifting from year to year.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 63 second-feet from the Little Sandy.

Accuracy.—Fair.

Cooperation.—Station maintained in cooperation with Eden Irrigation & Land Co., by which the field data were furnished.

Discharge measurements of Little Sandy Creek near Eden, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 26	W. E. Robertson	0.80	16.9	June 18	W. E. Robertson	2.30	194
May 10	do	1.15	44.2	July 3	do	1.63	92.4
29	do	1.18	40.7	29	do	.98	33.0
June 7	do	1.49	69.7	Aug. 5	do	.67	11.8
10	do	1.86	116				

Daily gage height, in feet, of Little Sandy Creek near Eden, Wyo., for 1911.

[W. E. Robertson, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		0.9	1.0	1.7	0.8	0.2	0.4
2		.9	1.1	1.6	.7	.2	
3		.9	1.1	1.63	.7	.2	.5
4		.9	1.2		.7	.2	.5
5		.9	1.3		.67	.2	.5
6		.9	1.35		.7	.2	.6
7		.9	1.49	1.5	.7	.2	
8		1.0	1.7	1.5	.7	.2	.7
9		1.1		1.6	.5	.2	.65
10		1.15	1.86	1.5	.6	.2	
11		1.2	2.0	1.4	.5	.2	.7
12		1.12	1.8	1.4	.6	.3	.7
13		1.0		1.3	.4	.4	.7
14						.3	.65
15		1.1		1.2	.5	.3	
16		1.1	2.2		.4	.3	.6
17		1.2	2.2	1.2		.3	
18		1.2	2.3	1.2		.2	.7
19		1.07	2.3	1.1		.2	.7
20		1.05	2.1	1.1		.2	
21		1.0		1.2	.3	.2	.5
22			2.3	1.2	.3	.2	.5
23		.9	2.4	1.2	.3	.2	
24		.85	2.4	1.1	.3	.2	.6
25	0.8	1.0	2.1	1.1	.3	.2	.7
26	.8		2.1	1.1	.3	.3	
27	.8	1.3	1.9		.3	.3	
28	.8	1.25	1.8	1.0	.3	.3	
29	.85	1.18	1.7	.98	.2	.2	
30				.9	.2	.3	
31		1.1		.8	.2		

Daily discharge, in second-feet, of Little Sandy Creek near Eden, Wyo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		23	34	101	20	0	4
2		23	38	89	13	0	5
3		23	38	93	13	0	6
4		23	46	89	13	0	6
5		23	54	85	12	0	6
6		23	58	81	13	0	9
7		23	71	78	13	0	11
8		30	95	78	13	0	13
9		42	106	89	6	0	11
10		46	116	78	9	0	12
11		51	136	69	6	0	13
12		44	108	69	7	2	13
13		34	125	60	4	4	13
14		38	142	56	5	2	11
15		42	159	51	6	2	10

Daily discharge, in second-feet, of Little Sandy Creek near Eden, Wyo., for 1911—Contd.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
16	....	42	177	51	4	2	9
17	....	51	177	51	4	2	11
18	....	51	194	51	3	0	13
19	....	40	194	42	3	0	13
20	....	38	160	42	2	0	10
21	....	34	177	51	2	0	6
22	....	30	194	51	2	0	6
23	....	27	213	51	2	0	8
24	....	23	213	42	2	0	9
25	16	34	160	42	2	0	13
26	16	47	160	42	2	2	12
27	16	60	127	38	2	2	11
28	16	56	115	34	2	2	10
29	19	44	101	32	0	0	9
30	21	41	101	27	0	2	9
31	....	38	....	20	0	....	8

NOTE.—Daily discharge determined from a fairly well-defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Little Sandy Creek near Eden, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 25–30	21	16	17.3	206	B.
May	60	23	36.9	2,270	B.
June	213	34	126	7,500	B.
July	101	20	59.1	3,630	B.
August	20	0	5.97	367	C.
September	4	0	.73	43	C.
October	13	4	9.68	595	C.
The period	....	....	....	14,600	

BEAVER CREEK BASIN.

BEAVER CREEK NEAR LADORE, COLO.

Location.—At Myers ranch, about 16 miles from Ladore, Colo.

Records available.—April 24, 1910, to November 30, 1911.

Drainage area.—27 square miles (State engineer's report).

Gage.—Vertical staff.

Channel.—Apparently shifting.

Discharge measurements.—Made by wading. High-water measurements are made by the slope method.

Winter flow.—Ice causes backwater and the records are discontinued during the winter months.

Diversions.—Water is diverted for irrigation above the station.

Cooperation.—Station maintained by the State engineer, who furnishes the records complete for publication.

The following discharge measurement was made by C. L. Chatfield:

June 2, 1911: Gage height, 0.30 foot; discharge, 0.25 second-foot.

Daily gage height, in feet, of Beaver Creek near Ladore, Colo., for 1911.

[F. F. Myers, observer.]

Day.	Apr.	May.	June.	July.	Sept.	Oct.	Nov.
1	0.7	0.7	0.3	0.1	....	0.5	0.6
2	1.9	.7	.3	.1	....	.5	.6
3	2.6	.7	.3	.1	....	.5	.6
4	2.55	.7	.3	.1	....	.6	.6
5	2.65	.7	.3	.05	....	.7	.6
6	1.95	.7	.3	.1	0.1	.75	.6
7	1.2	.7	.3	.1	.2	.7	.6
8	1.2	.6	.3	.2	.2	.7	.6
9	1.2	.5	.2	.15	.2	.6	.6
10	1.25	.5	.15	.1	.2	.6	.6
11	1.05	.4	.25	.1	.2	.6	.7
12	1.05	.4	.3	.1	.2	.6	.7
13	.85	.4	.3	.05	.2	.6	.7
14	.75	.4	.3	.05	.35	.6	.7
15	.65	.4	.3	.05	.4	.6	.7
16	.8	.4	.3	....	.4	.6	.7
17	1.0	.4	.3	....	.4	.6	.7
18	1.0	.4	.3	....	.4	.6	.7
19	1.0	.4	.3	....	.4	.6	.7
20	.8	.4	.3	....	.5	.6	.7
21	.8	.4	.3	....	.5	.6	.7
22	1.0	.4	.3	....	.5	.6	.7
23	1.0	.4	.3	....	.5	.6	.7
24	1.0	.4	.3	....	.5	.6	.7
25	1.0	.4	.3	....	.5	.6	.7
26	.9	.4	.2	....	.5	.6	.7
27	.8	.4	.2	....	.5	.6	.7
28	.7	.4	.1	....	.5	.6	.7
29	.7	.4	.1	....	.5	.6	.7
30	.7	.3	.1	....	.5	.6	.7
31	....	.3	....	....	....	.6	....

NOTE.—Gage heights affected by ice Dec. 5 to 31.

Daily discharge, in second-feet, of Beaver Creek near Ladore, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Sept.	Oct.	Nov.
1	2.3	2.3	0.3	0.2	....	0.7	1.2
2	43	2.3	.3	.2	....	.7	1.2
3	110	2.3	.3	.2	....	.7	1.2
4	104	2.3	.3	.2	....	1.2	1.2
5	117	2.3	.3	.1	....	2.3	1.2
6	46	2.3	.3	.2	0.2	3.0	1.2
7	13	2.3	.3	.2	.2	2.3	1.2
8	13	1.2	.2	.2	.2	2.3	1.2
9	13	.7	.2	.2	.2	1.2	1.2
10	14.5	.7	.2	.2	.2	1.2	1.2
11	9	.5	.2	.2	.2	1.2	2.3
12	9	.5	.2	.2	.2	1.2	2.3
13	4.6	.5	.3	.1	.2	1.2	2.3
14	3	.5	.3	.1	.4	1.2	2.3
15	1.8	.5	.3	.1	.5	1.2	2.3
16	3.7	.5	.3	....	.5	1.2	2.3
17	7.5	.5	.3	....	.5	1.2	2.3
18	7.5	.5	.3	....	.5	1.2	2.3
19	7.5	.5	.3	....	.5	1.2	2.3
20	3.7	.5	.3	....	.7	1.2	2.3
21	3.7	.5	.3	....	.7	1.2	2.3
22	7.5	.5	.3	....	.7	1.2	2.3
23	7.5	.5	.3	....	.7	1.2	2.3
24	7.5	.5	.3	....	.7	1.2	2.3
25	7.5	.5	.3	....	.7	1.2	2.3
26	5.4	.5	.2	....	.7	1.2	2.3
27	3.7	.5	.2	....	.7	1.2	2.3
28	2.3	.5	.2	....	.7	1.2	2.3
29	2.3	.5	.2	....	.7	1.2	2.3
30	2.3	.3	.2	....	.7	1.2	2.3
31	....	.3	....	....	....	1.2	....

NOTE.—Channel dry July 16 to Sept. 5.

Monthly discharge of Beaver Creek near Ladore, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April	117	2.3	19.4	1,156
May	2.3	.3	.9	57.1
June	.3	.2	.3	15.8
July	.2	0	.1	5.2
August	0	0	0	0
September	.7	.2	.4	24
October	3.0	.7	1.3	80.9
November	2.3	1.2	1.9	115
The period	....	....	....	1,454

VERMILION CREEK BASIN.

VERMILION CREEK NEAR LADORE, COLO.

Location.—About 5 miles from Ladore, Colo.

Records available.—July 1, 1910, to November 30, 1911.

Drainage area.—1,017 square miles (State engineer's report).

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge measurements.—Made by wading at ordinary stages and by the float method during high stages.

Winter flow.—Ice causes backwater and records are discontinued during the winter months.

Diversions.—No data.

Cooperation.—Station maintained by the State engineer, who furnishes the records complete for publication.

Discharge measurements of Vermilion Creek near Ladore, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 2	Chatfield and Turner	....	4.0
Oct. 3	C. L. Chatfield	0.00	201
4	.....do	−.60	45

Daily gage height, in feet, of Vermilion Creek near Ladore, Colo., for 1911.

[E. Bassett, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2.35	....	....	....	....	....	....	....	....	....
2	....	.6	....	....	....	....	....	....	....	....	3.4
3	....	....	4.45	....	....	....	....	....	....	....	.0
4	....	....	5.0	....	....	....	....	....	....	....	.0
5	....	....	5.75	2.1	....	....	....	....	....	....	.0
6	....	....	4.65	.6	....	....	....	....	....	....	.0
7	....	....	3.25	....	....	....	....	....	....	....	....
8	....	....	2.0	....	....	....	0.0	....	....	....	....
9	....	....	1.25	....	....	....	.6	....	....	....	....
10	....	....	.5	....	....	....	....	....	....	....	....

Daily gage height, in feet, of Vermilion Creek near Ladore, Colo., in 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11											
12						2.5					
13					0.85	1.2		2.25			
14								—.2			
15			2.55								
16			3.5								
17			4.6								
18			4.9								
19			3.1								
20			2.2								
21			3.25								
22			4.2								
23			3.1			2.2					
24			2.2			.15					
25			1.65						1.5		
26			.7						.9		
27											
28											
29									2.2	1.2	
30									.9	.0	
31	2.75										

YAMPA RIVER BASIN.

YAMPA RIVER AT YAMPA, COLO.

Location.—Near the bridge connecting the town of Yampa with the Denver, Northwestern & Pacific Railroad station.

Records available.—May 17, 1910, to November 16, 1911.

Drainage area.—52 square miles (State engineer's report).

Gage.—Vertical staff, whose datum was changed May 17, 1911.

Channel.—Shifting during high water.

Discharge measurements.—Made from the highway bridge.

Winter flow.—Ice causes backwater and the records are discontinued during the winter months.

Diversions.—There are court decrees for diversions of 258 second-feet from the headwater streams above Yampa.

Cooperation.—Records are furnished complete for publication by the State engineer, who maintains the station.

Discharge measurements of Yampa River at Yampa, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 23	C. L. Chatfield	2.30	20.4	July 16	C. L. Chatfield	0.70	8.9
25	.....do	2.20	16	Aug. 5	.....do	.45	1.2
May 17	.....do	1.20	52	Sept. 14	.....do	.78	8.5
June 13	.....do	1.60	104	Oct. 29	.....do	1.05	22

Daily gage height, in feet, and discharge, in second-feet, of Yampa River at Yampa, Colo., for 1911.

[C. L. Arnold, observer.]

Day.	July.		August.		September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	1.1	35	0.7	7	0.95	22	0.8	12	1.0	26
2	1.2	46	.7	7	.95	22	.8	12	1.0	26
3	1.1	35	.7	7	.9	18	.8	12	.95	22
4	1.3	59	.7	7	.9	18	.9	18	.95	22
5	1.2	46	.7	7	.9	18	1.0	26	1.05	30
6	1.1	35	.7	7	.9	18	1.0	26	1.05	30
7	1.0	26	.7	7	.85	15	.9	18	1.05	30
8	1.05	30	.7	7	.85	15	.9	18	1.0	26
9	1.1	35	.75	10	.85	15	.9	18	1.05	30
10	1.0	26	.75	10	.85	15	.8	12	1.15	30
11	1.0	26	.9	18	.85	15	.8	12	1.15	30
12	1.1	35	1.05	30	.8	12	.8	12	1.3	30
13	1.05	30	1.1	35	.8	12	.8	12	1.4	30
14	.95	22	.95	22	.8	12	.8	12	1.4	30
15	.85	15	1.0	26	.8	12	.8	12	1.4	30
16	.9	18	1.0	26	.8	12	.75	10	1.4	30
17	1.05	30	1.0	26	.85	15	.8	12	....	....
18	1.1	35	.95	22	.9	18	.8	12	....	....
19	1.15	40	.95	22	.9	18	.7	7	....	....
20	1.0	26	1.0	26	.9	18	.75	10	....	....
21	1.1	35	1.1	35	.9	18	.95	22	....	....
22	1.05	30	1.1	35	.8	12	1.15	40	....	....
23	.90	18	1.2	46	.8	12	1.3	59	....	....
24	.8	12	1.1	35	.8	12	1.25	52	....	....
25	.8	12	1.05	30	.8	12	1.1	35	....	....
26	.85	15	1.0	26	.85	15	1.1	35	....	....
27	.75	10	1.0	26	.85	15	1.05	30	....	....
28	.7	7	1.0	26	.9	18	1.05	30	....	....
29	.6	4	1.0	26	.9	18	1.0	26	....	....
30	.6	4	1.0	26	.9	18	1.0	26	....	....
31	.8	12	.95	22	....	....	1.0	26	....	....

Monthly discharge of Yampa River at Yampa, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
July	59	4	26	1,605
August	46	7	21	1,313
September	22	12	16	932
October	59	7	21	1,317
Nov. 1-16	30	22	28	897
The period	....	....	....	6,064

YAMPA RIVER AT STEAMBOAT SPRINGS, COLO.

Location.—At the lower steel bridge at Steamboat Springs; a short distance below the mouth of Spring Creek.

Records available.—May 3, 1904, to October 31, 1906; March 1, 1910, to November 30, 1911.

Drainage area.—572 square miles (State engineer's report).

Gage.—Automatic recording gage.

Channel.—Practically permanent.

Discharge measurements.—Made from the steel bridge.

Winter flow.—The hot springs keep the river practically open during the winter months.

Diversions.—There are court decrees for diversions of 115 second-feet from Yampa River between Yampa and Steamboat Springs, and diversions of 231 second-feet from intervening tributaries.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of Yampa River at Steamboat Springs, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 15	C. L. Chatfield	4.00	2,110	July 26	C. L. Chatfield	1.35	172
22	.....do	3.10	1,130	Aug. 29	.....do	1.00	77
June 10	.....do	3.62	1,850	Sept. 13	.....do	1.00	66
20	.....do	3.35	1,480	Oct. 31	.....do	1.13	89
July 18	.....do	1.55	243				

Daily gage height, in feet, of Yampa River at Steamboat Springs, Colo., for 1911.

[R. H. Tifdale, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.0	1.1	1.15	1.9	2.4	4.4	2.0	1.25	1.05	1.6	1.15
2	1.0	1.1	1.2	1.95	2.4	4.4	1.9	1.3	1.15	1.35	1.15
3	1.0	1.1	1.2	2.0	2.4	4.25	1.9	1.2	1.1	1.5	1.2
4	1.0	1.1	1.2	2.05	2.4	4.25	1.9	1.2	1.25	1.4	1.15
5	1.0	1.1	1.2	2.1		4.3	2.0	1.1	1.3	2.2	1.4
6	1.0	1.1	1.2	2.1		4.3	1.8	1.05	1.2	2.2	1.25
7	1.0	1.1	1.2	2.1		4.2	2.15	1.0	1.0	1.9	1.25
8	1.0	1.1	1.2	2.05		4.5	2.1	1.0	1.05	1.6	1.35
9	1.0	1.1	1.25	2.05		4.4	2.0	1.0	1.0	1.55	1.35
10	1.0	1.15	1.3	2.0	2.7	3.75	2.0	1.0	1.0	1.5	1.3
11	1.1	1.15	1.35	2.0		3.8	2.05	1.0	1.0	1.4	1.15
12	1.1	1.15	1.4	2.0		3.8	2.1	1.0	1.05	1.35	1.25
13	1.1	1.15	1.45	2.0		3.75	2.9	1.0	1.05	1.3	1.3
14	1.1	1.15	1.5	2.0		3.5	1.75	1.0	1.05	1.3	1.3
15	1.1	1.15	1.55	2.0	3.9	3.45	1.7	1.0	1.0	1.3	1.35
16	1.1	1.15	1.55	1.95		3.85	1.75	1.1	1.0	1.3	1.3
17	1.1	1.15	1.5	1.95		3.65	1.6	1.15	1.1	1.3	1.25
18	1.1	1.15	1.5	1.9		3.35	1.55	1.25	1.0	1.3	1.25
19	1.1	1.15	1.5	1.9		3.35	1.6	1.2	1.0	1.2	1.3
20	1.1	1.15	1.5	1.9	3.4	3.15	1.45	1.2	1.0	1.15	1.3
21	1.1	1.15	1.5	2.0	3.15	3.25	1.55		1.0	1.05	1.3
22	1.1	1.15	1.5	2.0	3.15	3.15	1.6		1.0	1.1	1.3
23	1.1	1.15	1.5	2.1	3.3	3.1	1.45		1.2	1.3	1.6
24	1.1	1.15	1.55	2.2	3.65	3.1	1.35		1.15	1.3	1.45
25	1.1	1.15	1.6	2.3	3.75	2.8	1.3		1.1	1.3	1.4
26	1.1	1.15	1.65	2.4	4.0	2.75	1.35		1.1	1.3	1.4
27	1.1	1.15	1.7	2.4	3.8	2.2	1.3	1.25	1.2	1.3	1.5
28	1.1	1.15	1.75	2.4		2.35	1.3	1.45	1.1	1.25	1.6
29	1.15		1.8	2.4		2.0	1.8	1.35	1.15	1.25	1.65
30	1.15		1.8	2.4		2.0	1.35	1.2	1.25	1.15	
31	1.15		1.85				1.25	1.05		1.1	

Daily discharge, in second-feet, of Yampa River at Steamboat Springs, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	73	95	105	380	680	2,635	430	130	80	250	102
2	73	93	115	405	680	2,635	380	145	102	162	102
3	73	93	115	430	680	2,478	880	115	90	215	115
4	73	93	115	458	680	2,478	380	115	130	180	102
5	73	93	115	485	720	2,530	430	90	145	545	180
6	73	93	115	485	760	2,530	330	80	115	545	130
7	73	93	115	485	800	2,425	515	70	70	380	130
8	73	93	115	458	840	2,640	485	70	80	250	162
9	73	93	130	458	880	2,635	430	70	70	232	162
10	73	105	145	430	905	1,870	430	70	70	215	145
11	93	105	162	430	1,125	1,920	458	70	70	180	102
12	93	105	180	430	1,345	1,920	485	70	80	162	130
13	93	105	198	430	1,565	1,870	380	70	80	145	145
14	93	105	215	430	1,785	1,630	310	70	80	145	145
15	93	105	232	430	2,020	1,580	290	70	70	145	162
16	93	105	232	405	1,935	1,970	310	90	70	145	145
17	93	105	232	405	1,835	1,772	250	102	90	145	130
18	93	105	215	380	1,735	1,488	232	130	70	145	130
19	93	105	215	380	1,635	1,488	250	115	70	115	145
20	93	105	215	380	1,535	1,300	198	115	70	102	145
21	93	105	215	430	1,300	1,392	232	120	70	80	145
22	93	105	215	430	1,300	1,300	250	120	70	90	145
23	93	105	215	485	1,440	1,255	198	120	102	145	145
24	93	105	232	545	1,770	1,255	162	125	102	145	145
25	93	105	250	610	1,870	990	145	125	90	145	145
26	93	105	270	680	2,120	948	162	130	90	145	145
27	93	105	290	680	1,920	545	145	130	115	145	145
28	93	105	310	680	2,060	645	145	198	90	130	145
29	105	....	330	680	2,200	430	145	162	102	130	145
30	105	....	330	680	2,340	430	162	115	130	102	145
31	105	....	355	....	2,480	....	130	80	....	90	....

NOTE.—Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Yampa River at Steamboat Springs, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	105	73	91	5,578
February	105	93	101	5,617
March	355	105	203	12,482
April	680	380	482	28,780
May	2,480	680	1,450	89,141
June	2,640	430	1,700	101,129
July	515	130	298	18,305
August	198	70	106	6,510
September	145	70	89	5,282
October	545	80	190	11,683
November	180	102	139	8,249
The period	....	....	....	292,766

YAMPA RIVER AT CRAIG, COLO.

Location.—One mile south of Craig on steel bridge on road to Hamilton, Colo., a short distance below the mouth of Fortification Creek.

Records available.—April 30, 1904, to October 31, 1906; April 1, 1910, to November 30, 1911.

Drainage area.—1,730 square miles.

Gage.—Vertical staff.

Channel.—Slightly shifting.

Discharge measurements.—Made from highway bridge.

Diversions.—There are court decrees for diversions of 238 second-feet from Yampa River between this station and Steamboat Springs, and 411 second-feet from intervening tributaries exclusive of a conditional decree for 587 second-feet from the North Fork of Elkhead Creek.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of Yampa River at Craig, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 11[a]	C. L. Chatfield	3.60	263	June 28	C. L. Chatfield	4.62	2,440
May 23	do	5.10	3,460	July 11	do	3.40	973
28	do	5.80	4,470	Aug. 8	do	2.45	206
June 6	do	6.35	5,850	Sept. 23	do	2.20	131
23	do	5.56	3,970	Oct. 26	do	2.60	330

[a] Ice present.

Daily gage height, in feet, of Yampa River at Craig, Colo., for 1911.

[Fred A. Aiken, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	3.55	5.0	6.2	4.15	2.75	2.35	3.0	2.5
2	3.85	4.65	6.4	4.25	2.7	2.35	3.2	2.5
3	4.1	4.55	6.25	4.05	2.65	2.35	3.1	2.5
4	4.5	4.85	6.3	4.1	2.55	2.45	3.05	2.5
5	4.4	4.85	6.25	4.0	2.55	2.45	3.25	2.45
6	4.25	5.55	6.4	4.15	2.45	2.45	4.15	2.6
7	4.05	6.25	6.4	4.1	2.45	2.35	3.7	2.5
8	3.8	6.3	6.35	3.95	2.45	2.35	3.35	2.45
9	3.65	6.65	6.8	3.9	2.45	2.35	3.1	2.5
10	3.9	7.05	6.3	3.55	2.45	2.25	3.05	2.5
11	3.95	6.6	5.9	3.4	2.45	2.25	3.0	2.5
12	3.7	5.85	5.85	3.3	2.45	2.25	2.9	
13	3.55	5.8	6.0	3.2	2.45	2.25	2.9	
14	3.4	6.0	6.0	3.15	2.45	2.25	2.7	
15	3.35	6.3	5.85	3.1	2.45	2.25	2.7	
16	3.3	6.35	5.95	3.05	2.45	2.25	2.7	
17	3.35	6.45	6.65	3.05	2.45	2.25	2.7	
18	3.3	6.4	6.2	3.15	2.45	2.25	2.7	
19	3.35	6.35	6.0	3.05	2.35	2.25	2.7	
20	3.4	5.85	6.1	3.05	2.35	2.25	2.7	
21	3.45	5.65	5.9	3.0	2.35	2.2	2.6	2.5
22	3.6	5.1	5.9	2.95	2.7	2.2	2.6	2.55
23	4.1	5.2	5.55	3.0	2.55	2.2	2.6	
24	4.6	5.6	5.3	3.1	2.55	2.3	2.7	
25	4.75	5.75	5.15	2.95	2.55	2.4	2.7	
26	4.85	5.85	4.8	2.95	2.55	2.35	2.7	
27	5.2	5.9	4.7	2.9	2.55	2.3	2.6	
28	5.5	6.0	4.45	2.85	2.45	2.4	2.6	
29	5.75	6.05	4.4	2.85	2.35	2.4	2.6	
30	5.4	6.15	4.25	2.85	2.35	2.45	2.6	
31		6.15		2.75	2.35		2.5	

Daily discharge, in second-feet, of Yampa River at Craig, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1,132	3,000	4,455	1,808	425	172	615	260
2	1,455	2,490	5,025	1,935	390	172	790	260
3	1,745	2,350	4,598	1,685	358	172	700	260
4	2,290	2,775	4,740	1,745	292	230	638	260
5	2,140	2,775	4,598	1,625	292	230	838	230
6	1,935	3,955	5,025	1,808	230	230	1,808	325
7	1,685	4,598	5,025	1,745	230	172	1,290	260
8	1,400	4,740	4,882	1,578	230	172	932	230
9	1,238	6,825	7,350	1,510	230	172	700	260
10	1,510	8,315	4,740	1,132	230	120	658	260
11	1,578	6,650	4,700	980	230	120	615	260
12	1,290	4,585	4,585	885	230	120	535	260
13	1,132	4,470	4,940	790	230	120	535	260
14	980	4,940	4,940	745	230	120	390	260
15	932	4,740	4,585	700	230	120	390	260
16	885	4,882	4,820	658	230	120	390	260
17	932	5,178	6,825	658	230	120	390	260
18	885	5,025	4,455	745	230	120	390	260
19	932	4,882	4,940	658	172	120	390	260
20	980	4,585	4,190	658	172	120	390	260
21	1,030	4,150	4,700	615	172	95	325	260
22	1,185	3,160	4,700	575	390	95	325	292
23	1,745	3,320	3,955	615	292	95	325	260
24	2,420	4,050	3,490	700	292	145	390	260
25	2,630	4,360	3,240	575	292	200	390	260
26	2,775	4,585	2,700	575	292	172	358	260
27	3,320	4,700	2,560	535	292	145	325	260
28	3,860	4,940	2,210	496	230	200	325	260
29	4,360	5,065	2,140	496	172	200	325	260
30	3,670	4,222	1,935	496	172	230	325	260
31	....	4,222	....	425	172	....	260	....

NOTE.—Discharge Nov. 12 to 20 and 23 to 30 interpolated.

Monthly discharge of Yampa River at Craig, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April	4,360	885	1,801	107,189
May	8,315	2,350	4,469	274,778
June	7,350	1,935	4,368	259,930
July	1,935	425	973	59,804
August	425	172	254	15,588
September	230	95	154	9,162
October	1,808	260	551	33,872
November	325	230	261	15,544
The period	....	....	....	775,867

YAMPA RIVER NEAR MAYBELL, COLO.

Location.—At the Thornburg bridge 9 miles below Maybell. The nearest tributary is Deception Creek, which enters the river about 2 miles above.

Records available.—April 17, 1904, to October 31, 1905; June 12, 1910, to November 30, 1911.

Drainage area.—3,670 square miles (State engineer's report).

Gage.—Chain.

Channel.—Practically permanent.

Discharge measurements.—Made from the bridge.

Winter flow.—Ice causes backwater at the gage and the records are discontinued during the winter months.

Diversions.—There are court decrees for diversions of 115 second-feet from Yampa River between this station and Craig. Below Maybell, there are decrees for diversions of 37 second-feet from Yampa River.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of Yampa River near Maybell, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 14	C. L. Chatfield	0.72	196
Oct. 8	....do	2.50	1,290

Daily gage height, in feet, of Yampa River near Maybell, Colo., for 1911.

[Peter Farrell, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		3.95	1.1	0.9	0.95	1.2
2		3.8	1.0	1.0	1.1	1.05
3		3.75	1.0	1.1	1.45	.9
4		3.65	.9	.9	1.85	.95
5	5.4	3.55	.8	.85	2.3	1.3
6	5.75	3.4	.65	.9	2.9	1.45
7	5.45	3.35	.65	.85	3.15	1.5
8	5.5	3.05	.55	.75	3.35	1.2
9	5.55	3.0	.55	.8	3.25	1.15
10	5.8	2.95	.5	.85	3.15	1.05
11	5.65	2.9	.5	.65	3.4	1.0
12	5.5	2.85	.65	.6	3.15	.9
13	5.1	2.8	.6	.85	3.05	1.05
14	5.05	2.8	.7	.8	2.85	1.15
15	5.5	2.8	.75	.65	3.4	1.2
16	6.0	2.75	.75	.7	3.5	1.1
17	5.0	2.7	.7	.75	3.15	1.1
18	4.9	2.6	.8	.8	2.95	1.2
19	4.85	2.5	1.0	.85	2.8	1.46
20	4.8	2.25	1.05	.9	2.75	1.6
21	4.6	2.1	.9	1.15	2.45	1.8
22	4.65	1.8	.85	1.25	2.3	1.7
23	4.55	1.7	.9	1.55	2.25	1.35
24	4.85	1.65	.75	1.4	2.1	1.3
25	4.85	1.65	.75	1.15	1.9	1.2
26	4.75	1.5	.9	.9	1.75	1.45
27	4.7	1.55	.95	.85	1.65	1.6
28	4.4	1.4	.85	.85	1.35	1.5
29	3.45	1.35	.8	.8	1.25	1.35
30	3.95	1.2	.7	.85	1.2	1.3
31		1.1	.75		1.15	

NOTE.—Gage heights affected by ice Nov. 18 to 30.

Daily discharge, in second-feet, of Yampa River near Maybell, Colo., for 1911.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2,935	345	255	278	395
2	....	2,740	300	300	345	322
3	....	2,675	300	345	530	255
4	....	2,548	255	255	780	445
5	4,960	2,422	215	235	1,120	445
6	5,480	2,340	165	255	1,680	530
7	5,032	2,282	165	235	1,955	560
8	5,105	1,845	138	198	2,282	395
9	5,180	1,790	138	215	2,168	370
10	5,555	1,735	125	235	1,955	322
11	5,330	1,680	125	165	2,340	300
12	5,105	1,628	165	150	1,965	255
13	4,525	1,575	150	235	1,845	322
14	4,452	1,575	180	215	1,628	370
15	5,105	1,575	198	165	2,340	395
16	5,855	1,525	198	180	2,360	345
17	4,380	1,475	180	198	1,955	345
18	4,235	1,380	215	215	1,735	395
19	4,162	1,290	300	235	1,575	395
20	4,090	1,080	322	265	1,475	395
21	3,805	965	255	370	1,248	395
22	3,875	745	235	420	1,120	395
23	3,738	680	255	590	1,080	395
24	4,162	650	198	500	965	395
25	4,162	650	198	370	815	395
26	4,018	560	255	255	712	395
27	3,945	590	278	235	650	395
28	3,535	500	235	235	472	395
29	2,400	472	215	215	420	395
30	2,935	395	180	235	395	395
31	....	345	198	....	370	....

NOTE.—Discharge estimated Nov. 18 to 30 because of presence of ice.

Monthly discharge of Yampa River near Maybell, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
June 5-30	5,855	2,400	4,428	228,353
July	2,935	345	1,440	89,556
August	345	125	216	13,252
September	590	150	266	15,800
October	2,360	278	1,308	80,426
November	560	255	384	22,822
The period	....	....	....	449,209

SODA CREEK AT STEAMBOAT SPRINGS, COLO.

Location.—At the Main Street Bridge at Steamboat Springs, below all tributaries, the nearest being a small creek that enters from the east about 2 miles above.

Records available.—June 8, 1910, to August 31, 1911.

Drainage area.—47 square miles (State engineer's report).

Gage.—Chain gage.

Channel.—Practically permanent.

Discharge measurements.—Made from highway bridge.

Cooperation.—Station maintained and records furnished complete for publication by the State engineer.

Discharge measurements of Soda Creek at Steamboat Springs, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 21	C. L. Chatfield		[a] 2.5	July 24	C.L. Chatfield	1.30	17
May 16	do	2.80	297	Aug. 29	do	.80	.83
20	do	2.35	153	Sept. 13	do	.85	1.12
22	do	2.22	124	Oct. 31	do	1.20	8.4
June 17	do	2.52	225				

[a] Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Soda Creek at Steamboat Springs, Colo., for 1911.

Day.	May.		June.		July.		August.	
	Gage height.	Discharge.	Gage height	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			2.7	270	2.1	100	1.1	8
2			2.45	185	1.9	69	1.05	6.5
3			2.75	290	1.9	69	1.0	5
4			2.9	350	1.85	63	1.0	5
5			2.9	350	1.9	69	.9	2.5
6			2.8	310	1.9	69	.9	2.5
7			3.05	410	1.8	57	.85	1.8
8			2.95	370	1.8	57	.8	1
9			2.85	330	1.7	47	.8	1
10			2.7	270	1.7	47	.8	1
11			2.75	290	1.7	47	.8	1
12			2.75	290	1.7	47	.8	1
13			2.7	270	1.7	47	.8	1
14			2.9	350	1.6	38	.8	1
15	2.9	350	3.1	430	1.5	30	.8	1
16	2.8	310	3.4	560	1.5	30	.8	1
17	2.8	310	3.0	395	1.5	30	.8	1
18	2.5	200	3.0	395	1.45	26	.8	1
19		180	3.15	450	1.4	23	.8	1
20	2.35	158	3.05	410	1.4	23	.8	1
21	2.2	120	2.9	350	1.4	23	.8	1
22	2.2	120	3.1	430	1.4	23	.9	2.5
23	2.55	218	2.8	310	1.3	17	.95	3.8
24	2.55	218	2.45	185	1.3	17	.9	2.5
25	2.65	252	2.25	132	1.2	17	.9	2.5
26	2.7	252	2.45	185	1.2	12	.9	2.5
27	2.7	270	2.35	158	1.2	12	.9	2.5
28	2.65	252	2.3	145	1.1	8	.9	2.5
29	2.6	235	2.1	100	1.1	8	.9	2.5
30	2.75	290	2.05	92	1.1	8	.9	2.5
31	2.7	290			1.1	8	.9	2.5

NOTE.—Discharge May 19 interpolated.

Monthly discharge of Soda Creek at Steamboat Springs, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May 15-31	350	120	237	7,984
June	560	92	302	17,954
July	100	8	37	2,253
August	8	1	2.3	142
The period				28,333

ELK RIVER NEAR CLARK, COLO.

Location.—At Kinney's ranch, 2 miles above Clark post office, Colo.

Records available.—May 1, 1910, to September 30, 1911.

Drainage area.—213 square miles (State engineer's report).

Gage.—Chain gage.

Channel.—Rough but permanent.

Diversions.—There are court decrees for diversions of 4 second-feet from Elk River above this station and 25 second-feet from tributaries entering above.

Cooperation.—Records are furnished complete for publication by the State engineer who maintains the station in cooperation with the Elk River Irrigation and Construction Co.

Discharge measurements of Elk River near Clark, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 20[a]	C. L. Chatfield		62	July 22	C. L. Chatfield	3.50	399
June 11	do	5.05	1,440	23	do	3.30	345
19	do	5.05	1,450	Sept. 18	do	2.15	56

[a] Ice conditions.

Daily gage height, in feet, and discharge, in second-feet, of Elk River near Clark, Colo., for 1911.

[H. S. Deane, observer.]

Day.	June.		July.		August.		September.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	5.4	1,780	4.0	640	3.0	250	2.35	122
2	5.2	1,580	4.1	700	2.95	238	2.35	122
3	5.35	1,730	4.05	670	2.9	225	2.35	122
4	5.45	1,830	4.0	640	2.8	205	2.35	122
5	5.4	1,780	4.0	640	2.8	205	2.35	122
6	5.3	1,680	3.9	585	2.7	185	2.35	122
7	5.2	1,580	3.8	535	2.7	185	2.3	115
8	5.9	2,335	3.7	490	2.7	185	2.3	115
9	5.4	1,780	3.5	405	2.7	185	2.3	115
10	5.3	1,680	3.5	405	2.65	175	2.3	115
11	5.35	1,730	3.5	405	2.65	175	2.3	115
12	5.4	1,780	3.45	388	2.65	175	2.3	115
13	5.4	1,780	3.4	370	2.6	165	2.3	115
14	5.4	1,780	3.4	370	2.6	165	2.4	130
15	5.5	1,880	3.4	370	2.6	165	2.45	138
16	6.0	2,460	3.4	370	2.6	165	2.4	130
17	5.3	1,680	3.3	335	2.6	165	2.3	115
18	5.2	1,580	3.3	335	2.55	155	2.25	108
19	5.1	1,480	3.3	335	2.55	155	2.25	108
20	5.1	1,480	3.3	335	2.55	155	2.2	100
21	5.1	1,480	3.2	305	2.6	165	2.25	108
22	5.1	1,480	3.45	388	2.7	185	2.2	100
23	5.0	1,380	3.4	370	2.7	185	2.2	100
24	5.0	1,380	3.3	335	2.5	145	2.2	100
25	4.85	1,245	3.2	305	2.4	130	2.2	100
26	4.55	1,000	3.2	305	2.4	130	2.15	92
27	4.1	700	3.2	305	2.4	130	2.15	92
28	4.1	700	3.15	290	2.4	130	2.15	92
29	4.05	670	3.15	290	2.35	122	2.15	92
30	4.0	640	3.1	275	2.35	122	2.6	165
31			3.05	262	2.35	122		

Monthly discharge of Elk River near Clark, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
June	2,460	640	1,535	91,359
July	700	262	411	25,296
August	250	122	169	10,401
September	165	92	114	6,758
The period				133,814

ELK RIVER NEAR TRULL, COLO.

Location.—Two miles southwest of Trull post office on the road between Steamboat Springs and Hayden; below all tributaries; none above the station for several miles.

Records available.—May 2, 1904, to August 16, 1906; May 1, 1910, to November 30, 1911.

Drainage area.—415 square miles (State engineer's report).

Gage.—Chain gage.

Channel.—Fairly permanent.

Discharge measurements.—Made from highway bridge.

Diversions.—Between this station and that near Clark there are court decrees for diversions of 111 second-feet from Elk River, and 62 second-feet from intervening tributaries. There are no decrees for diversions below the station.

Cooperation.—Station maintained and records furnished complete for publication by the State engineer.

Discharge measurements of Elk River near Trull, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 17[a]	C. L. Chatfield		93	July 24	Chatfield and Turner.	6.0	375
May 16	do	8.98	2,720	Aug. 31	do	5.07	91
June 7	Chatfield and Turner.	9.1	2,880	Sept. 15	do	5.12	102

[a] Ice conditions.

Daily gage height, in feet, of Elk River near Trull, Colo., for 1911.

[Fred O. Smith, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		6.0	7.35	8.9	7.4	5.65	5.0	6.6	5.3
2		6.15	7.25	8.9	7.4	5.65	5.0	6.5	5.2
3		6.35	7.25	8.75	7.25	5.55	5.0	6.25	5.1
4		6.55	7.75	8.8	7.3	5.5	5.15	5.8	5.2
5		6.4	8.45	9.05	7.2	5.5	5.1	6.7	5.1
6		6.3	8.9	9.15	7.25	5.4	5.1	7.4	5.1
7		6.15	8.7	9.05	7.05	5.35	5.1	7.1	5.1
8		6.3	9.2	9.65	6.95	5.35	5.1	6.9	5.1
9		6.2	9.5	9.3	6.75	5.4	5.1	6.25	5.1
10		6.25	9.3	8.45	6.5	5.4	5.0	5.95	
11		6.25	8.4	8.4	6.45	5.4	5.0	5.8	
12		6.1	8.15	8.75	6.3	5.4	5.0	5.8	
13		5.9	8.5	8.8	6.3	5.3	5.05	5.7	
14		5.8	8.45	8.75	6.3	5.3	5.1	5.5	
15		5.7	9.05	8.75	6.2	5.3	5.1	5.5	5.35

Daily gage height, in feet, of Elk River near Trull, Colo., for 1911—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16	....	5.7	8.95	8.9	6.15	5.3	5.05	5.5	5.35
17	....	5.9	8.85	9.25	6.2	5.3	5.0	5.4	5.3
18	....	6.05	8.95	8.75	6.2	5.25	5.0	5.4	5.3
19	....	6.15	8.45	9.1	6.15	5.3	5.0	5.4	5.3
20	5.5	6.4	8.0	8.95	6.05	....	4.95	5.35	....
21	5.5	6.6	7.65	8.7	6.0	....	5.0	5.3	....
22	5.5	6.8	7.6	8.8	6.05	5.3	5.2	5.4	....
23	5.45	7.0	7.75	8.35	6.05	5.3	5.3	5.4	....
24	5.6	7.15	8.25	8.2	6.0	5.3	5.3	5.3	....
25	5.5	7.35	8.3	7.85	5.9	5.3	5.3	5.3	....
26	5.4	7.6	8.4	7.8	5.8	5.3	5.35	5.3	....
27	5.3	7.95	8.1	7.6	5.9	5.3	5.3	5.3	....
28	5.3	8.2	8.0	7.65	5.8	5.2	5.25	5.25	....
29	5.35	8.15	8.35	7.65	5.8	5.1	5.25	5.2	....
30	5.45	7.95	8.3	7.35	5.7	5.1	5.3	5.2	....
31	5.7	....	8.65	....	5.7	5.0	....	5.2	....

Daily discharge, in second-feet, of Elk River near Trull, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	388	1,220	2,670	1,258	251	80	700	148
2	....	458	1,145	2,670	1,258	251	80	642	122
3	....	559	1,145	2,511	1,145	219	80	507	100
4	....	671	1,540	2,564	1,182	204	111	304	122
5	....	586	2,199	2,834	1,108	204	100	762	100
6	....	532	2,670	2,947	1,145	174	100	1,258	100
7	....	458	2,458	2,834	1,000	161	100	1,036	100
8	....	532	3,004	3,526	929	161	100	894	100
9	....	482	3,352	3,120	795	174	100	507	100
10	....	507	3,120	2,199	642	174	80	366	122
11	....	507	2,148	2,148	614	174	80	304	122
12	....	434	1,902	2,511	532	174	80	304	122
13	....	344	2,250	2,564	532	148	90	268	122
14	....	304	2,199	2,511	532	148	100	204	122
15	....	268	2,834	2,511	482	148	100	204	161
16	....	268	2,724	2,670	458	148	90	204	161
17	....	344	2,617	3,062	482	148	80	174	148
18	....	411	2,724	2,511	482	135	80	174	148
19	....	458	2,199	2,890	458	148	80	174	148
20	204	586	1,760	2,724	411	148	71	161	148
21	204	700	1,457	2,458	388	148	80	148	148
22	204	828	1,416	2,564	411	148	122	174	148
23	189	964	1,540	2,098	411	148	148	174	148
24	234	1,072	1,999	1,950	388	148	148	148	148
25	204	1,220	2,048	1,626	344	148	148	148	148
26	174	1,416	2,148	1,582	304	148	161	148	148
27	148	1,715	1,854	1,416	344	148	148	148	148
28	148	1,950	1,760	1,457	304	122	135	135	148
29	161	1,902	2,098	1,457	304	100	135	122	148
30	189	1,715	2,048	1,220	268	100	148	122	148
31	268	....	2,406	....	268	80	....	122	....

NOTE.—Daily discharge for days for which gage heights are missing obtained by interpolation and from climatologic records.

Monthly discharge of Elk River near Trull, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 20-31	268	148	194	4,616
April	1,950	268	753	44,785
May	3,352	1,145	2,128	130,877
June	3,526	1,220	2,394	142,423
July	1,258	268	619	38,041
August	251	80	159	9,779
September	161	71	105	6,258
October	1,258	122	347	21,295
November	161	100	133	7,926
The period				406,000

TROUT CREEK AT PINNACLE, COLO.

Location.—One-fourth mile above Pinnacle, in Routt County, Colo.

Records available.—April 9, 1910, to December 31, 1911.

Drainage area.—27 square miles (State engineer's report).

Gage.—Vertical staff.

Channel.—Permanent.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater and the records are discontinued during the winter months.

Diversions.—No data.

Cooperation.—Station maintained by the State engineer, who furnishes the records complete for publication.

Discharge measurements of Trout Creek at Pinnacle, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 23[a]	C. L. Chatfield	1.80	11	Aug. 26	C. L. Chatfield	1.87	13
May 26	C. E. Turner	2.50	65.8	Oct. 28	do	1.78	9.7
July 15	C. L. Chatfield	1.95	19.7				

[a] Ice conditions.

Daily gage height, in feet, of Trout Creek at Pinnacle, Colo., for 1911.

[Mrs. D. M. Chapman, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			1.75	1.9	2.75	2.2	1.9	1.8	1.9	1.8	1.8
2			1.75	1.9	2.9	2.1	1.9	1.8	1.85	1.8	1.8
3			1.8	1.95	2.7	2.1	1.9	1.8	1.9	1.8	1.8
4			1.8	2.00	2.7	2.1	1.9	1.85	1.95	1.8	1.8
5		1.7	1.8	2.1	2.8	2.1	1.85	1.85	2.05	1.7	1.8
6		1.7	1.8	2.2	2.8	2.1	1.8	1.8	1.95	1.7	1.8
7		1.75	1.8	2.25	2.9	2.1	1.8	1.8	1.95	1.7	1.8
8		1.75	1.75	2.3	3.0	2.1	1.8	1.8	1.95	1.7	1.7
9		1.75	1.8	2.4	2.85	2.05	1.8	1.8	1.9	1.95	1.8
10		1.75	1.8	2.1	2.65	2.0	1.8	1.8	1.9	1.95	1.8
11		1.8	1.8	2.1	2.65	2.0	1.9	1.8	1.9	1.95	1.8
12		1.7	1.8	2.15	2.7	2.0	1.85	1.8	1.85	1.8	1.8
13		1.75	1.7	2.25	2.65	1.95	1.85	1.8	1.85	1.8	1.8
14		1.7	1.7	2.4	2.6	1.9	1.85	1.8	1.8	1.8	1.8
15		1.75	1.8	2.4	2.4	1.95	1.85	1.8	1.8	1.8	1.8

Daily gage height, in feet, of Trout Creek at Pinnacle, Colo., for 1911—Continued.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16		1.75	1.8	2.4	2.4	1.95	1.8	1.8	1.8	1.95	1.8
17		1.75	1.8	2.4	2.35	1.95	1.8	1.8	1.75	1.9	1.8
18		1.75	1.8	2.45	2.4	1.95	1.8	1.8	1.7	1.8	1.8
19		1.75	1.85	2.25	2.4	1.9	1.8	1.8	1.7	1.8	1.8
20		1.75	1.9	2.2	2.4	1.9	1.8	1.8	1.7	1.8	1.8
21		1.7	1.9	2.2	2.35	1.9	1.8	1.8	1.9	1.8	1.8
22		1.7	1.9	2.2	2.4	1.9	1.85	1.75	2.4	1.8	1.8
23	1.80	1.7	1.9	2.3	2.3	1.9	1.9	1.8	2.15	1.8	1.8
24		1.8	1.9	2.35	2.3	1.9	1.9	1.8	1.8	1.8	1.8
25		1.7	1.9	2.5	2.25	1.9	1.9	1.8	1.8	1.8	1.8
26		1.7	1.9	2.5	2.25	1.9	1.85	1.8	1.85	1.8	1.8
27		1.8	2.0	2.4	2.25	1.9	1.85	1.8	1.8	1.8	1.8
28		1.7	2.0	2.4	2.25	1.9	1.85	1.8	1.8	1.8	1.8
29		1.75	2.0	2.5	2.2	1.9	1.85	1.8	1.8	1.8	1.8
30		1.75	2.0	2.6	2.2	1.9	1.8	1.8	1.8	1.8	1.8
31		1.75		2.7		1.9	1.8		1.8		1.8

NOTE.—Ice affected the gage height on Feb. 23, and it is quite probable that there was a slight effect until Mar. 4.

Daily discharge, in second-feet, of Trout Creek at Pinnacle, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9	9	17	159	49	17	11	17	11	11
2	9	9	17	202	36	17	11	14	11	11
3	9	11	21	145	36	17	11	17	11	11
4	9	11	25	145	36	17	14	21	11	11
5	7	11	36	173	36	14	14	30	7	11
6	7	11	49	173	36	11	11	21	7	11
7	9	11	56	202	36	11	11	21	7	11
8	9	9	64	232	36	11	11	21	7	7
9	9	11	80	188	30	11	11	17	21	11
10	9	11	36	132	25	11	11	17	21	11
11	11	11	36	132	25	17	11	17	21	11
12	7	11	42	145	25	14	11	14	11	11
13	9	7	56	132	21	14	11	14	11	11
14	7	7	80	120	17	14	11	11	11	11
15	9	11	80	80	21	14	11	11	11	11
16	9	11	80	80	21	11	11	11	21	11
17	9	11	80	72	21	11	11	9	17	11
18	9	11	89	80	21	11	11	7	11	11
19	9	14	56	80	17	11	11	7	11	11
20	9	17	49	80	17	11	11	7	11	11
21	7	17	49	72	17	11	11	17	11	11
22	7	17	49	80	17	14	9	80	11	11
23	7	17	64	64	17	17	11	42	11	11
24	11	17	72	64	17	17	11	11	11	11
25	7	17	98	56	17	17	11	11	11	11
26	7	17	98	56	17	14	11	14	11	11
27	11	25	80	56	17	14	11	11	11	11
28	7	25	80	56	17	14	11	11	11	11
29	9	25	98	49	17	14	11	11	11	11
30	9	25	120	49	17	11	11	11	11	11
31	9		145		17	11		11		11

NOTE.—Daily discharge estimated Mar. 1 to 4 because of ice.

Monthly discharge of Trout Creek at Pinnacle, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March	11	7	8.5	526
April	25	7	14	827
May	145	17	65	3,971
June	232	49	112	6,653
July	49	17	24	1,486
August	17	11	14	831
September	14	9	11	662
October	80	7	17	1,059
November	21	7	12	714
December	11	7	11	668
The period				17,397

FISH CREEK AT DUNKLEY, COLO.

Location.—At wagon bridge one-fourth mile below Dunkley, in Routt County, Colo., near the center of T. 4 N., R. 87 W., and the northern boundary of the White River National Forest.

Records available.—April 8, 1910, to November 30, 1911.

Drainage area.—29 square miles (State engineer's report).

Gage.—Vertical staff.

Channel.—Practically permanent.

Cooperation.—Records are furnished complete for publication by the State engineer, who maintains the station in cooperation with the Williams River Highline Irrigation Co.

Discharge measurements of Fish Creek at Dunkley, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 10	C. L. Chatfield		8
May 27	C. E. Turner	2.70	19.6
July 13	C. L. Chatfield	2.00	15
Aug. 26	.....do	1.95	1.38

Daily gage height, in feet, of Fish Creek at Dunkley, Colo., for 1911.

[R. S. Bird, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		2.95	3.0	2.5	2.45	2.2	2.0	2.8	2.1
2		2.9	3.0	2.55	2.55	2.15	2.0	2.7	2.2
3		2.9	3.2	2.5	2.5	2.1	2.0	2.5	2.15
4		2.9	3.4	2.4	2.6	2.2	2.0	2.35	2.1
5	2.7	3.0	3.4	2.45	2.4	2.1	2.0	3.0	2.1
6	3.2	2.8	4.3	2.35	2.35	2.2	2.0	2.9	2.1
7	3.3	2.9	4.7	2.4	2.4	2.1	2.0	2.8	2.2
8	3.3	2.85	5.3	2.4	2.25	2.1	2.0	2.6	2.15
9	3.3	2.7	5.85	2.4	2.05	2.1	2.0	2.4	2.1
10	5.15	2.65	6.05	2.4	2.0	2.0	2.0	2.4	2.05
11	4.8	2.5	6.0	2.35	2.1	2.0	2.0	2.3	2.1
12	3.0	2.5	5.45	2.4	2.1	2.0	2.0	2.3	2.0
13	3.0	2.3	4.75	2.3	2.2	2.0	2.0	2.2	2.0
14	2.5	2.3	4.4	2.4	2.4	2.0	2.0	2.2	2.0
15	2.4	2.1	4.25	2.5	2.45	2.0	2.0	2.2	2.05
16	2.55	2.1	4.2	3.0	2.6	2.0	2.0	2.2	2.0
17	2.65	2.1	4.2	3.0	2.5	2.0	2.0	2.15	2.0
18	3.05	2.05	4.05	3.0	2.35	2.0	2.0	2.1	2.0
19	2.7	1.9	3.95	3.0	2.2	1.95	2.0	2.0	2.0
20	2.8	2.05	3.85	3.05	2.2	2.0	2.0	2.0	1.9

Daily gage height, in feet, of Fish Creek at Dunkley, Colo., for 1911—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
21	2.85	2.1	3.9	2.95	2.1	2.0	2.0	2.0	1.95
22	2.8	2.15	3.7	2.9	2.1	2.0	2.05	2.2	2.0
23	2.75	2.1	3.55	2.9	2.0	2.0	2.2	2.1	1.9
24	2.65	2.2	3.3	2.7	2.05	2.0	2.1	2.15	1.95
25	2.5	2.7	3.05	2.45	2.0	2.0	2.05	2.2	1.9
26	2.7	2.85	2.8	2.45	2.1	2.0	2.0	2.1	1.9
27	2.7	3.7	2.75	2.4	2.1	2.0	2.0	2.1	1.9
28	2.8	4.1	2.65	2.25	2.1	2.0	2.1	2.1	1.9
29	2.8	4.0	2.6	2.3	2.1	2.0	2.1	2.1	1.95
30	2.95	3.0	2.5	2.3	2.1	1.95	2.1	2.1	1.9
31	2.95	....	2.55	....	2.15	2.0	....	2.1	....

Daily discharge, in second-feet, of Fish Creek at Dunkley, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	15	26	26	17	7	3	1	11	2
2	15	24	26	18	9	2	1	10	3
3	15	24	30	17	8	2	1	7	2
4	20	24	35	16	10	3	1	4	2
5	20	26	35	16	7	2	1	15	2
6	30	22	60	15	5	3	1	13	2
7	32	24	74	16	6	2	1	11	3
8	32	23	98	16	4	2	1	8	2
9	60	20	124	16	3	2	1	5	2
10	92	20	134	16	1	1	1	5	2
11	78	17	131	13	2	1	1	4	2
12	26	17	104	14	2	1	1	4	1
13	26	14	76	13	3	1	1	3	1
14	17	14	53	14	4	1	1	3	1
15	16	11	58	15	6	1	1	3	2
16	18	11	56	22	8	1	1	3	1
17	20	11	56	22	7	1	1	2	1
18	27	10	52	22	4	1	1	2	1
19	20	8	48	22	3	1	1	1	1
20	22	10	46	23	3	1	1	1	.5
21	23	11	47	19	2	1	1	1	1
22	22	12	42	18	3	1	1	3	1
23	21	11	38	18	1	1	3	2	.5
24	20	12	32	14	2	1	2	2	1
25	17	20	27	11	1	1	1	3	.5
26	20	23	22	9	2	1	1	2	.5
27	20	42	21	8	2	1	1	2	.5
28	22	53	20	6	2	1	2	2	.5
29	22	50	19	7	2	1	2	2	1
30	25	26	17	7	2	1	2	2	.5
31	25	....	18	....	2	1	....	2	....

NOTE.—Daily discharge Mar. 1 to 4 estimated by interpolation.

Monthly discharge of Fish Creek at Dunkley, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March	92	15	27	1,662
April	53	8	20	1,220
May	134	17	52	3,223
June	23	6	15	912
July	10	1	3.9	240
August	3	1	1.4	85
September	3	1	1.2	71
October	15	1	4.5	274
November	3	.5	1.4	80
The period	....	....	....	7,767

ELK HEAD CREEK NEAR CRAIG, COLO.

Location.—One mile above the mouth at bridge on road between Steamboat Springs and Craig, the latter being 6 miles west. No tributary between the station and the mouth and none for several miles above.

Records available.—April 27 to September 7, 1906; April 17, 1910, to November 30, 1911.

Drainage area.—249 square miles (measured from Land Office map).

Gage.—Chain gage.

Channel.—Permanent.

Diversions.—There are court decrees for diversions of 45 second-feet from Elk Head Creek above the station and 48 second-feet from tributaries entering above. In addition, there are conditional decrees for reservoir diversions of 177,000 acre-feet from Elk Head Creek and a diversion of 587 second-feet from the North Fork.

Cooperation.—Station maintained and records furnished complete for publication by the State engineer.

Discharge measurements of Elk Head Creek near Craig, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 11	C. L. Chatfield	....	14	June 22	C. L. Chatfield	5.20	114
May 23	.....do	7.14	464	July 13	.....do	4.23	12.5
June 6	Chatfield and Turner	5.73	175	Sept. 22	.....do	3.50	0.

Daily gage height, in feet, of Elk Head Creek near Craig, Colo., for 1911.

[W. F. Harrison, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	7.2	7.75	6.3	4.25	4.0	3.4	4.25	4.0
2	6.45	7.5	6.15	4.35	3.95	3.4	4.25	4.0
3	7.0	7.55	6.05	4.35	3.9	3.5	4.5	4.0
4	6.85	7.95	5.95	4.35	3.85	3.5	4.55	4.0
5	6.45	9.3	5.8	4.3	3.8	3.4	4.7	4.0
6	6.1	9.7	5.7	4.4	3.8	3.4	5.1	4.0
7	6.35	9.95	5.7	4.4	3.8	3.4	4.7	4.0
8	6.5	10.2	5.6	4.35	3.7	3.4	4.35	4.0
9	6.6	10.35	5.5	4.35	3.7	3.5	4.2	4.0
10	6.05	9.1	5.5	4.3	3.7	3.5	4.0	4.0
11	5.75	7.95	5.35	4.3	3.7	3.5	4.0	4.1
12	5.5	8.05	5.2	4.2	3.7	3.4	4.0	4.1
13	5.45	8.15	5.2	4.2	3.7	3.4	4.0	4.1
14	5.15	8.6	5.1	4.25	3.7	3.4	4.0	4.2
15	5.15	8.55	4.95	4.0	3.7	3.4	4.0	4.2
16	5.2	9.0	....	4.0	3.7	3.4	4.0	4.2
17	5.2	8.8	5.9	4.05	3.7	3.4	3.95	4.0
18	5.5	8.7	5.45	4.2	3.7	3.4	3.85	4.1
19	5.6	8.3	5.6	4.15	3.7	3.4	4.0	4.0
20	6.49	7.2	5.45	4.15	3.7	3.4	4.0	4.1
21	6.6	6.85	5.2	4.4	3.7	3.4	4.0	4.0
22	6.9	6.8	5.45	4.3	3.7	3.4	4.1	4.0
23	7.25	7.1	5.0	4.2	3.7	3.4	4.15	4.0
24	7.3	7.25	4.9	4.2	3.7	3.4	4.0	4.0
25	7.9	7.35	4.75	4.2	3.65	3.5	4.0	4.0
26	8.45	7.3	4.6	4.2	3.55	3.5	4.1	....
27	9.0	6.85	4.45	4.1	3.55	3.5	4.1	....
28	8.75	6.65	4.35	4.1	3.5	3.5	4.1	....
29	7.9	6.55	4.3	4.05	3.5	3.7	4.0	....
30	8.4	6.4	4.2	4.0	3.5	3.7	4.0	....
31	....	6.35	....	4.0	3.5	....	....	....

Daily discharge, in second-feet, of Elk Head Creek near Craig, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	462	578	284	18	6	0	18	6
2	312	525	256	24	4	0	18	6
3	422	536	238	24	3	0	34	6
4	392	621	220	24	2	0	38	6
5	312	942	195	21	1	0	50	6
6	247	1,045	179	27	1	0	94	6
7	294	1,110	179	27	1	0	50	6
8	322	1,178	163	24	0.5	0	24	6
9	342	1,218	148	24	.5	0	15	6
10	238	892	148	21	.5	0	6	6
11	187	621	127	21	.5	0	6	10
12	148	643	107	15	.5	0	6	10
13	141	666	107	15	.5	0	6	10
14	100	770	94	18	.5	0	6	15
15	100	758	75	6	.5	0	6	15
16	107	867	144	6	.5	0	6	15
17	107	818	212	8	.5	0	4	6
18	148	794	141	15	.5	0	2	10
19	163	700	163	12	.5	0	6	6
20	312	462	141	12	.5	0	6	10
21	342	392	107	27	.5	0	6	6
22	402	382	141	21	.5	0	10	6
23	472	442	81	15	.5	0	12	6
24	483	472	69	15	.5	0	6	6
25	610	494	54	15	.2	0	6	6
26	734	483	41	15	0	0	10	6
27	867	392	30	10	0	0	10	6
28	806	352	24	10	0	0	10	6
29	610	332	21	8	0	0.5	6	6
30	723	303	15	6	0	.5	6	6
31	....	294	....	6	0	....	6	....

NOTE.—Discharge for days for which gage heights are missing determined by interpolation.

Monthly discharge of Elk Head Creek near Craig, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April	867	100	364	21,660
May	1,218	294	648	39,832
June	284	15	130	7,743
July	27	6	16	1,012
August	6	0	.9	54
September	.5	0	.03	2
October	94	2	16	979
November	15	6	7.6	450
The period	....	....	....	71,723

FORTIFICATION CREEK AT CRAIG, COLO.

Location.—One-eighth mile east of Craig on the road to Hayden. No tributaries between the station and the mouth, and none for some distance above.

Records available.—June 12, 1905, to July 30, 1906; March 5, 1910, to November 30, 1911.

Drainage area.—256 square miles (measured from Land Office map).

Gage.—Chain gage.

Channel.—Shifting.

Discharge measurements.—Made from bridge.

Diversions.—There are court decrees for diversions of 91 second-feet from Fortification Creek above the station and 20 second-feet from tributaries entering above. There is also a conditional decree for a diversion of 235,000 acre-feet from Fortification Creek.

Cooperation.—Station is maintained and records furnished complete for publication by the State engineer.

Discharge measurements of Fortification Creek at Craig, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 12[a]	C. L. Chatfield		8.5	June 23	C. L. Chatfield	3.75	42
Mar. 10[a]	E. S. Foote	9.90	375	July 13	do		[b].5
May 24	C. L. Chatfield	4.47	100	Aug. 8	do		.0
June 6	Chatfield and Turner	3.70	37	Sept. 22	do		.0

[a] Ice conditions. [b] Estimated.

Daily gage height, in feet, of Fortification Creek at Craig, Colo., for 1911.

[Mrs. E. L. Jameson, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Oct.	Nov.
1		4.4	4.85	3.95	2.7		4.9	
2		4.7	4.55	4.0	2.6		3.9	
3		4.7	4.45	3.9	2.6		4.7	
4		4.8	4.6	3.6	2.6		3.7	
5		4.55	5.45	3.75	2.65		5.85	
6		4.0	6.35	3.65	2.6		5.55	
7		3.85	6.35	3.55	2.6		4.15	
8	11.1	3.65	6.5	3.6	2.6		3.45	
9	10.25	3.8	6.9	3.6			3.2	
10	10.5	4.0	6.85	3.5			3.1	
11	8.5	4.15	5.8	3.45			3.1	
12	5.5	3.8	5.2	3.3			3.0	
13	5.05	3.6	5.05	3.25			2.95	
14	5.05	3.45	5.1	4.6			2.8	
15	5.0	3.35	5.2	3.8			2.8	
16	5.8	3.35	5.2	3.5			2.8	
17	5.95	3.45	5.1	4.05	3.15		2.8	
18	4.85	3.65	5.1	3.95				
19	5.45	3.95	4.8	4.25				
20	5.45	4.2	4.35	3.85				
21	6.2	4.45	4.05	3.85		4.75		3.4
22	5.7	4.7	4.2	3.9		4.55		3.35
23	5.45	4.9	4.1	3.75		3.15		3.35
24	4.85	5.0	4.4	3.6				3.35
25	4.4	5.05	4.4	3.45				3.35
26	3.65	4.95	4.25	3.3				3.3
27	3.5	5.4	4.25	3.3				3.5
28	3.75	5.65	4.0	3.05				
29	3.8	5.95	3.9	3.05				
30	4.4	4.85	3.8	2.7				
31	4.75		3.8					

NOTE.—Ice affected the gage heights Mar. 8 to 11.

Daily discharge, in second-feet, of Fortification Creek at Craig, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	95	125	55	10	0	0	82	12
2	....	115	105	60	5	0	0	34	12
3	....	115	100	50	5	0	0	70	12
4	....	120	110	35	5	0	0	27	12
5	....	105	165	40	5	0	0	152	12
6	....	75	250	40	5	0	0	128	12
7	....	70	250	30	3	0	0	44	12
8	500	60	270	40	2	0	0	20	12
9	410	65	320	40	.5	0	0	13	12
10	450	75	310	35	.5	0	0	11	12
11	220	85	195	30	.5	0	0	11	15
12	170	65	160	25	.5	0	0	9	15
13	135	55	135	25	.5	0	0	8	15
14	135	50	140	80	.5	0	0	6	15
15	135	45	150	40	.5	0	0	6	15
16	195	45	160	35	.5	0	0	6	15
17	210	50	140	55	13	0	0	6	15
18	125	60	140	50	1	0	0	6	15
19	165	75	120	60	1	0	0	6	15
20	165	85	90	50	1	0	0	6	15
21	235	100	80	50	.5	75	0	6	18
22	190	115	85	50	.5	60	0	6	16
23	165	125	80	45	.5	10	0	6	16
24	125	135	95	35	.5	0	0	6	16
25	95	135	95	30	.5	0	0	6	16
26	60	130	80	25	0	0	0	6	15
27	50	160	80	25	0	0	0	6	15
28	60	185	65	20	0	0	0	6	15
29	65	210	60	20	0	0	0	6	15
30	95	125	50	10	0	0	0	6	15
31	115	....	50	....	0	0	....	6	....

NOTE.—Daily discharge estimated Mar. 8 to 11 on account of ice. Discharge July 9 to 16, 18 to 25, Oct. 18 to Nov. 20, and Nov. 28 to 30, estimated by interpolation and from climatologic reports. No flow in the creek from July 26 to Aug. 20 and Aug. 24 to Sept. 30.

Monthly discharge of Fortification Creek at Craig, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 8-31	500	50	178	8,469
April	210	45	98	5,812
May	320	50	137	8,400
June	80	10	39.5	2,350
July	13	0	1.7	102
August	75	0	4.7	288
September	0	0	0	0
October	152	6	23	1,422
November	18	12	14	847
The period	....	....	....	27,685

WILLIAMS RIVER NEAR PYRAMID, COLO.

Location.—At Dunstan's ranch, 3 miles below Pyramid post office. Willow Creek, the nearest important tributary, enters from the east about 8 miles below the station.

Records available.—April 14, 1910, to November 30, 1911.

Drainage area.—98 square miles (measured from Hayden's atlas).

Gage.—Vertical staff.

Channel.—Permanent.

Discharge measurements.—Made from footbridge.

Diversions.—The Williams Highline ditch diverts water several miles above the station. The natural flow is somewhat regulated by Basin reservoir on the headwaters.

Cooperation.—Records are furnished complete for publication by the State engineer, who maintains the station in cooperation with the Williams River Highline Irrigation Co.

Discharge measurements of Williams River near Pyramid, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 10	C. L. Chatfield	1.60	29	Aug. 24	Chatfield and Ault	1.50	47
May 26	C. E. Turner	2.45	318	Oct. 27	C. L. Chatfield	1.35	34
July 14	C. L. Chatfield	1.80	84				

Daily gage height, in feet, of Williams River near Pyramid, Colo., for 1911.

[Edna B. Evans, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1.5	1.8	2.6	2.05	1.5	1.4	1.45	1.35
2	....	1.55	1.75	2.55	2.0	1.5	1.4	1.5	1.35
3	....	....	1.8	2.5	1.95	1.5	1.4	1.55	1.35
4	....	....	2.0	2.55	1.95	1.5	1.4	1.55	1.35
5	1.25	....	2.3	2.6	1.9	1.5	1.4	2.05	1.35
6	1.25	1.45	2.8	2.55	1.9	1.5	1.4	1.65	1.35
7	1.3	1.35	2.3	....	1.9	1.5	1.4	1.55	1.4
8	1.35	....	2.7	3.1	1.9	1.5	1.4	1.5	1.4
9	1.35	1.45	2.95	2.7	1.9	1.5	1.4	1.5	1.4
10	1.35	1.5	2.45	2.55	1.9	1.5	1.4	1.4	1.4
11	1.35	1.55	2.2	2.55	1.85	1.5	1.4	1.4	1.4
12	1.35	1.5	2.3	2.6	1.85	1.5	1.4	1.4	....
13	1.4	1.45	2.35	2.55	1.8	1.5	1.4	1.4	....
14	1.4	....	2.7	2.55	1.8	1.4	1.35	1.35	....
15	1.35	1.4	2.6	2.5	1.8	1.4	1.35	1.4	....
16	1.35	1.45	2.5	2.4	1.8	1.4	1.4	1.35	....
17	1.35	....	2.6	2.4	1.8	1.4	1.4	1.3	....
18	1.35	....	2.55	2.55	1.8	1.4	1.4	1.3	....
19	1.3	....	2.45	2.4	1.75	1.4	1.4	1.35	....
20	1.35	....	2.3	2.35	1.75	1.45	1.4	1.35	....
21	1.35	1.5	2.15	2.45	1.7	1.6	1.4	1.35	....
22	1.35	1.65	....	2.4	1.8	1.6	1.4	1.4	....
23	1.35	1.75	2.4	2.4	1.7	1.5	1.4	1.4	....
24	1.3	1.7	....	2.35	1.7	1.5	1.4	1.4	....
25	1.3	....	....	2.25	1.65	1.45	1.4	1.4	....
26	1.4	1.85	....	2.2	1.7	1.4	1.3	1.4	....
27	1.35	2.0	2.35	2.0	1.7	1.4	1.3	1.35	....
28	1.4	2.05	....	1.9	1.7	1.4	1.35	1.35	....
29	1.35	....	2.4	2.0	1.7	1.4	1.45	1.35	....
30	1.35	1.9	2.45	1.95	1.65	1.4	1.45	1.4	....
31	1.4	....	2.55	....	1.55	1.4	....	1.35	....

Daily discharge, in second-feet, of Williams River near Pyramid, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	28	51	128	462	214	51	36	44	31
2	28	62	114	436	195	51	36	51	31
3	28	62	128	410	178	51	36	62	31
4	28	62	195	436	178	51	36	62	31
5	28	62	315	462	160	51	36	214	31
6	28	44	315	436	160	51	36	86	31
7	26	31	315	436	160	51	36	62	36
8	31	31	518	790	160	51	36	51	36
9	31	44	678	518	160	51	36	51	36
10	31	51	386	436	160	51	36	36	36
11	31	62	272	436	144	51	36	36	36
12	31	51	315	462	144	51	36	36	36
13	36	44	338	436	128	51	36	36	36
14	36	44	518	436	128	36	31	31	36
15	31	36	462	410	128	36	31	36	36
16	31	44	410	361	128	36	36	31	36
17	31	44	462	361	128	36	36	26	36
18	31	44	436	436	128	36	36	26	36
19	26	44	386	361	114	36	36	31	36
20	31	44	315	338	114	44	36	31	36
21	31	51	252	386	99	73	36	31	36
22	31	86	252	361	128	73	36	36	36
23	31	114	361	361	99	51	36	36	36
24	26	99	361	338	99	51	36	36	36
25	26	99	361	294	86	44	36	36	36
26	36	144	361	272	99	36	26	36	36
27	31	195	338	196	99	36	26	31	36
28	36	214	338	160	99	36	31	31	36
29	31	214	361	195	99	36	44	31	36
30	31	160	386	178	86	36	44	36	36
31	36	....	436	....	62	36	....	31	....

NOTE.—Discharge for days for which gage heights are missing determined by interpolation and from climatologic reports.

Monthly discharge of Williams River near Pyramid, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March	36	28	30	1,821
April	214	36	78	4,627
May	678	114	349	21,439
June	790	160	387	23,007
July	214	62	130	8,061
August	73	36	46	2,838
September	44	26	35	2,105
October	214	26	45	2,797
November	....	....	[a] 35	2,082
The period	....	....	....	68,777

[a] The discharge from Nov. 12 to 30 was estimated at 36 second-feet.

WILLIAMS RIVER AT HAMILTON, COLO.

Location.—Near Hamilton, at highway bridge, on the road from Meeker to Craig. Morapos Creek, the nearest tributary, enters some distance below the station.

Records available.—April 29, 1904, to October 31, 1906; April 15, 1910, to November 11, 1911.

Drainage area.—341 square miles (measured from Land Office map).

Gage.—Chain gage.

Channel.—Shifting.

Discharge measurements.—Made from highway bridge.

Diversions.—There are court decrees for diversions of 40 second-feet from Williams River above the station, and 7 second-feet below. There are also decrees for diversions of 87 second-feet from tributaries entering above.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of Williams River at Hamilton, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 8[a]	C. L. Chatfield	3.00	61	Aug. 23	C. L. Chatfield	2.62	46
May 25	C. E. Turner	5.37	844	Oct. 10	.....do	2.80	78
June 30	C. L. Chatfield	3.53	220	25	.....do	2.70	63
July 10	.....do	3.15	138				

[a] Ice conditions.

Daily gage height, in feet, of Williams River at Hamilton, Colo., for 1911.

[Carrie A. Hamilton, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		3.0	3.1	5.55	3.5	2.7	2.55	3.2	2.6
2		3.0	2.9	5.35	3.65	2.7	2.55	3.1	2.6
3		3.1	4.0	5.2	3.55	2.7	2.6	3.1	2.6
4		3.4	4.25	5.2	3.5	2.7	2.6	3.0	2.65
5		3.3	5.05	5.3	3.45	2.7	2.7	3.75	2.75
6		3.15	5.65	5.25	3.45	2.65	2.7	3.8	2.75
7		3.15	5.7	5.3	3.4	2.65	2.7	3.25	2.75
8		3.1	6.35	6.2	3.35	2.6	2.65	2.9	2.75
9		3.05	6.6	6.05	3.25	2.6	2.6	2.9	2.75
10		3.1	6.45	5.75	3.15	2.6	2.6	2.85	2.75
11		3.05	5.85	5.4	3.1	2.6	2.6	2.75	2.75
12	3.2	3.0	5.0	4.85	3.0	2.6	2.6	2.7	
13	3.2	3.0	5.55	4.9	3.0	2.6	2.6	2.7	
14	3.05	3.05	5.9	4.9	2.95	2.6	2.7	2.7	
15	3.1	2.85	5.8	5.1	3.0	2.55	2.7	2.7	
16	2.9	3.0	6.05	4.85	3.0	2.55	2.6	2.65	
17	3.0	3.05	6.2	4.85	2.95	2.55	2.6	2.6	
18	2.85	2.95	5.85	4.8	2.9	2.55	2.6	2.6	
19	2.8	3.1	5.65	4.9	2.9	2.55	2.6	2.6	
20	2.9	3.1	5.0	4.9	2.85	2.5	2.6	2.45	
21	2.95	3.3	4.7	5.5	2.8	2.6	2.6	2.4	
22	2.9	3.5	4.65	5.05	2.85	2.7	2.6	2.5	
23	2.95	3.7	5.05	4.45	3.0	2.65	2.6	2.75	
24	2.95	3.8	5.7	4.25	2.9	2.6	2.6	2.7	
25	2.9	3.55	5.25	4.15	2.85	2.6	2.6	2.7	
26	2.8	4.0	5.65	4.05	2.8	2.55	2.6	2.7	
27	3.0	4.05	5.05	3.85	2.7	2.55	2.7	2.7	
28	2.95	4.55	4.95	3.8	2.9	2.55	2.7	2.65	
29	2.95	3.65	5.05	3.65	2.75	2.55	2.7	2.6	
30	2.95	3.75	5.25	3.55	2.7	2.55	2.7	2.6	
31	3.0		5.35		2.7	2.55		2.6	

Daily discharge, in second-feet, of Williams River at Hamilton, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	108	125	804	204	58	36	143	43
2	....	108	295	730	238	58	36	125	43
3	....	125	320	678	215	58	43	125	43
4	....	183	385	678	204	58	43	108	43
5	....	162	626	713	194	58	58	260	43
6	....	134	840	696	194	50	58	272	43
7	....	134	859	713	183	50	58	152	43
8	....	125	1,118	1,052	172	43	50	91	43
9	....	116	1,234	992	152	43	43	91	43
10	....	125	1,164	878	134	43	43	82	43
11	....	116	914	748	125	43	43	66	43
12	143	108	610	562	108	43	43	58	....
13	143	108	804	577	108	43	43	58	....
14	116	116	933	577	100	43	58	58	....
15	125	82	896	643	108	36	58	58	....
16	91	108	992	562	108	36	43	50	....
17	108	116	1,052	562	100	36	43	43	....
18	82	100	914	546	91	36	43	43	....
19	82	125	840	577	91	36	43	43	....
20	91	125	610	577	82	30	43	24	....
21	100	162	515	785	74	43	43	19	....
22	91	204	500	626	82	58	43	30	....
23	100	249	626	440	108	50	43	66	....
24	100	272	859	886	91	43	43	58	....
25	91	215	696	358	82	43	43	58	....
26	74	320	840	332	74	36	43	58	....
27	108	332	626	284	58	36	58	58	....
28	100	470	594	272	91	36	58	50	....
29	100	238	626	238	66	36	58	43	....
30	100	260	696	215	58	36	58	43	....
31	108	....	730	....	58	36	....	43	....

Monthly discharge of Williams River at Hamilton, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 12-31	143	74	103	4,072
April	470	82	172	10,207
May	1,234	125	737	45,302
June	1,052	215	593	35,308
July	238	58	121	7,444
August	58	30	44	2,686
September	58	36	47	2,813
October	272	19	80	4,911
November 1-11	43	43	43	938
The period	....	....	....	113,681

LITTLE SNAKE RIVER NEAR DIXON, WYO.

Location.—One mile west of Dixon, Wyo. Nearest tributaries: Cottonwood Creek, which enters a short distance east of Dixon, and Beaver Creek, which enters a mile or less downstream.

Records available.—May 27, 1910, to November 30, 1911.

Drainage area.—1,294 square miles (State engineer's report).

Gage.—Chain gage.

Channel.—Practically permanent.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer of Colorado.

Discharge measurements of Little Snake River near Dixon, Wyo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 13[a]	C. L. Chatfield		141	June 27	C. L. Chatfield	2.40	643
May 25	do	4.68	2,060	29	do	2.20	471
June 25	do	2.75	785	Sept. 25	do	.62	34

[a] Ice conditions.

Daily gage height, in feet, of Little Snake River near Dixon, Wyo., for 1911.

[Edith Madsen, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		2.35	3.8	5.45	1.85	0.55	0.35	2.4	1.0
2		2.5	3.6	4.9	1.75	.5	.45	1.65	.95
3		2.7	3.5	4.7	1.75	.45	.4	1.85	1.0
4		2.65	3.7	4.7	1.65	.4	.4	1.6	1.0
5		2.55	4.35	4.75	1.65	.35	.3	1.9	1.3
6		2.2	5.2	4.7	1.6	.2	.35	2.7	1.15
7		2.1	5.15	4.6	1.5	.35	.35	2.1	1.05
8		1.9	5.4	4.7	1.35	.5	.45	1.65	1.05
9		2.05	5.8	4.8	1.4	.4	.45	1.45	1.1
10		2.3	5.75	4.3	1.4	.25	.45	1.4	1.1
11		2.25	5.2	4.05	1.1	.3	.45	1.4	1.05
12		2.2	4.6	4.1	.95	.3	.4	1.3	1.05
13		1.85	4.8	4.1	.95	.35	.35	1.3	1.05
14		1.85	5.05	4.0	1.2	.45	.4	1.15	1.1
15	1.25	1.75	5.4	4.0	.75	.4	.4	1.1	1.0
16	1.3	1.85	5.3	4.1	.7	.35	.5	1.2	1.1
17	1.4	1.9	5.2	4.2	.75	.35	.55	1.15	1.2
18	1.3	1.85	5.45	4.1	.85	.3	.5	1.2	1.3
19	1.3	2.15	5.05	4.0	.9	.3	.55	1.2	1.3
20	1.5	2.6	4.6	3.9	.75	.3	.55	1.1	1.2
21	1.8	2.8	4.4	3.8	.8	.35	.6	.9	1.15
22	1.85	3.2	4.25	3.6	.75	.35	.6	.9	1.3
23	2.0	3.4	4.65	3.3	.7	.25	.65	1.1	1.1
24	2.15	3.6	4.8	3.1	.7	.3	.65	1.1	1.3
25	1.95	3.7	4.7	2.8	.75	.3	.6	1.15	1.3
26	1.6	3.8	5.0	2.6	.65	.35	.55	1.15	
27	1.55	4.3	4.8	2.4	.55	35	.6	1.1	
28	1.75	4.65	4.5	2.3	.4	.35	.75	1.0	
29	1.55	4.75	4.6	2.1	.65	.25	.8	1.0	
30	1.6	4.25	4.55	1.95	.75	.35	.95	.95	
31	1.95		4.75		.5	.35		1.0	

Daily discharge, in second-feet, of Little Snake River near Dixon, Wyo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	140	585	1,425	2,688	360	22	12	610	85
2	140	660	1,295	2,230	320	20	18	280	75
3	140	760	1,230	2,070	320	18	15	360	85
4	140	735	1,360	2.070	280	15	15	260	85
5	140	685	1,805	2,110	230	12	10	380	160
6	145	510	2,475	2,070	260	5	12	760	118
7	145	465	2,432	1,990	225	12	12	465	95
8	145	380	2,645	2,070	175	20	18	280	95
9	145	442	3,000	2,150	190	15	18	208	105
10	145	560	2,955	1,770	190	8	18	190	105
11	145	535	2,475	1,595	105	10	18	190	95
12	145	510	1,990	1,630	75	10	15	160	95
13	145	360	2,150	1,630	75	12	12	160	95
14	145	360	2,350	1,560	130	18	15	118	105
15	145	320	2,645	1,560	42	15	15	105	85

Daily discharge, in second-feet, of Little Snake River near Dixon, Wyo., for 1911—Contd.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16	160	360	2,560	1,630	35	12	20	130	105
17	190	380	2,475	1,700	42	12	22	118	130
18	160	360	2,688	1,630	58	10	20	130	160
19	160	488	2,350	1,560	65	10	22	130	160
20	225	710	1,990	1,490	42	10	22	105	130
21	340	810	1,840	1,425	50	12	25	65	118
22	360	1,045	1,735	1,295	42	8	25	65	160
23	420	1,165	2,030	1,105	35	8	30	105	105
24	488	1,295	2,150	985	35	10	30	105	160
25	400	1,360	2,070	810	42	10	25	118	160
26	260	1,425	2,310	710	30	12	22	118	130
27	242	1,770	2,150	610	22	12	25	105	130
28	320	2,030	1,915	560	15	12	42	85	130
29	242	2,110	1,990	465	30	8	50	85	130
30	260	1,735	1,952	400	42	12	75	75	130
31	400	....	2,110	....	20	12	....	85	....

NOTE.—Discharge Mar. 1 to 14 and Nov. 26 to 30 estimated from climatologic reports.

Monthly discharge of Little Snake River near Dixon, Wyo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March	488	140	219	13,442
April	2,110	320	830	49,408
May	3,000	1,230	2,147	131,994
June	2,688	400	1,519	90 383
July	360	15	117	7,204
August	22	5	12	738
September	75	10	23	1,346
October	760	65	198	12,198
November	160	75	117	6,964
The period	....	....	....	313,717

SLATER CREEK NEAR SLATER, COLO.

Location.—At a private bridge 3 miles south of Slater post office, about sec. 28, T. 12 N., R. 89 W. No important tributary below the station and none for several miles above.

Records available.—May 28, 1910, to October 31, 1911.

Drainage area.—143 square miles (State engineer's report).

Gage.—Vertical staff.

Channel.—Practically permanent.

Diversions.—There are court decrees for diversions of 14 second-feet from Slater Creek.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of Slater Creek near Slater, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 13[a]	C. L. Chatfield	....	23
May 26	.....do	2.90	486
June 26	.....do	1.90	118
Sept. 25	.....do	1.10	86

[a] Ice present.

Daily gage height, in feet, of Slater Creek near Slater Colo., for 1911.

[H. V. Rowell, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	1.55	2.3	2.95	1.7	1.15	1.05	1.9
2	....	1.6	2.2	3.0	1.7	1.15	1.05	1.95
3	....	1.65	2.2	2.85	1.65	1.1	1.1	1.8
4	....	1.8	2.5	2.9	1.65	1.1	1.2	1.8
5	....	1.65	2.9	3.05	1.6	1.1	1.15	2.1
6	....	1.55	3.4	3.05	1.5	1.1	1.15	2.1
7	....	1.5	3.6	3.2	1.5	1.1	1.15	1.8
8	....	1.35	3.65	3.3	1.5	1.1	1.1	1.55
9	....	1.5	3.85	3.0	1.45	1.05	1.1	1.5
10	....	1.55	3.4	2.6	1.4	1.05	1.1	1.45
11	....	1.55	2.85	2.5	1.4	1.05	1.1	1.45
12	....	1.6	2.9	2.55	1.3	1.05	1.1	1.4
13	....	1.55	3.45	2.6	1.3	1.05	1.1	1.4
14	....	1.45	3.2	2.6	1.2	1.05	1.2	1.4
15	....	1.3	3.45	2.55	1.2	1.0	1.15	1.45
16	....	1.3	3.35	3.05	1.2	1.0	1.1	1.4
17	1.2	1.3	3.35	2.85	1.25	1.0	1.1	1.4
18	1.2	1.4	3.15	2.55	1.25	1.0	1.1	1.4
19	1.3	1.6	2.65	2.65	1.2	1.0	1.1	1.45
20	1.3	1.7	2.5	2.45	1.2	1.0	1.1	1.45
21	1.4	1.8	2.5	2.55	1.2	1.0	1.1	1.45
22	1.5	1.85	2.65	2.3	1.2	1.0	1.1	1.45
23	1.5	2.0	2.9	2.2	1.25	1.1	1.2	1.5
24	1.5	2.1	2.65	2.1	1.25	1.1	1.15	1.45
25	1.45	2.15	2.9	2.0	1.25	1.0	1.15	1.45
26	1.4	2.2	2.9	1.9	1.2	1.0	1.2	1.45
27	1.4	2.4	2.8	1.8	1.2	1.0	1.25	1.45
28	1.35	2.65	2.7	1.8	1.2	1.0	1.3	1.4
29	1.35	2.8	2.75	1.75	1.2	1.0	1.3	1.35
30	1.4	2.5	2.9	1.7	1.15	1.0	1.35	1.3
31	1.5	....	3.0	....	1.15	1.05	....	1.3

Daily discharge, in second-feet, of Slater Creek near Slater, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	20	58	230	515	82	12	6	120
2	20	65	200	540	82	12	6	131
3	20	74	200	465	74	8	8	100
4	20	100	305	490	74	8	15	100
5	20	74	490	568	65	8	12	170
6	20	58	770	568	50	8	12	170
7	20	50	880	655	50	8	12	100
8	20	31	910	710	50	8	8	58
9	20	50	1,022	540	44	6	8	50
10	20	58	770	345	37	6	8	44
11	15	58	465	305	37	6	8	44
12	15	65	490	325	25	6	8	37
13	15	58	798	345	25	6	8	37
14	15	44	655	345	15	6	15	37
15	15	25	798	325	15	5	12	44
16	15	25	740	568	15	5	8	37
17	15	25	740	465	20	5	8	37
18	15	37	625	325	20	5	8	37
19	25	65	368	368	15	5	8	44
20	25	82	305	286	15	5	8	44
21	37	100	305	325	15	5	8	44
22	50	110	368	230	15	5	8	44
23	50	142	490	200	20	8	15	50
24	50	170	368	170	20	8	12	44
25	44	185	490	142	20	5	12	44
26	37	200	490	120	15	5	15	44
27	37	267	440	100	15	5	20	44
28	31	368	390	100	15	5	25	37
29	31	440	415	91	15	5	25	31
30	37	350	490	82	12	5	31	25
31	50	....	540	....	12	6	....	25

NOTE.—Discharge Mar. 1 to 16 estimated from climatologic reports.

Monthly discharge of Slater Creek near Slater, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March	50	15	27	1,634
April	440	25	113	6,722
May	1,022	200	534	32,820
June	710	82	354	21,060
July	82	12	32	1,952
August	12	5	6.5	397
September	31	6	12	708
October	170	25	60	3,715
The period				68,996

ASHLEY CREEK BASIN.

ASHLEY CREEK NEAR VERNAL, UTAH.

Location.—In sec. 13, T. 3 S., R. 20 E., Salt Lake base and meridian, about 1 mile below the Ashley Creek power plant and about 15 miles north of Vernal, Utah; 2½ miles above the mouth of Dry Fork.

Records available.—March 18, 1900, to December 31, 1904, at a point below the mouth of Dry Fork; October 8, 1911, to December 31, 1911, at present site.

Drainage area.—107 square miles.

Gage.—Vertical staff on the right bank.

Channel.—Shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice affects the relation of gage height to discharge during the greater part of the winter months.

Diversions.—Above all diversions.

Artificial control.—The operation of the power plant probably has no effect on the flow at the station.

Accuracy.—Poor, because of lack of discharge measurements. As only one discharge measurement was made during 1911 and one in 1912 (taken at the same gage height as the 1911 measurement) a rating curve can not be constructed.

Cooperation.—Maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by E. C. La Rue:

October 8, 1911: Gage height, 1.68 feet; discharge, 108 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of Ashley Creek near Vernal, Utah, for 1911.

[Grant Carpenter, observer.]

Day.	October.		November.		December.		Day.	October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1							16						
2					1.3	47	17						
3							18	1.6	91				
4							19			1.38	57		
5			1.45	66	1.3	47	20					1.27	44
6							21						
7							22	1.55	82				
8	1.68	1.08					23						
9							24					1.25	42
10					1.3	47	25						
11	1.65	1.02					26	1.55	82	1.33	51		
12							27					1.24	42
13			1.35	53	1.3	47	28						
14					1.28	45	29						
15	1.6	91					30						
							31	1.5	73				

Monthly discharge of Ashley Creek near Vernal, Utah, for 1911.

Month.	Discharge in second-feet (Mean.)	Run-off (total in acre-feet).	Accuracy.
October	92.2	5,670	D.
November	57.9	3,450	D.
December	44.7	2,750	C.

NOTE.—Monthly means estimated by interpolating daily discharge between days when gage was read.

DUCHESNE RIVER BASIN.

DUCHESNE RIVER AT MYTON, UTAH.

Location.—At the highway bridge at Myton, Utah, in secs. 24–25, T. 3 S., R. 2 W., Uinta special base and meridian, 3 miles below the mouth of Lake Fork Creek, and 15 miles above the mouth of the Uinta River.

Records available.—October 26, 1899, to November 30, 1910; July 26, 1911, to December 31, 1911.

Drainage area.—2,750 square miles.

Gage.—Chain gage attached to upstream side of bridge.

Channel.—Cobblestones; fairly permanent.

Discharge measurements.—Made from highway bridge.

Winter flow.—Ice may affect relation of gage height to discharge at times during the winter months.

Diversions.—A large portion of the low-water flow of the Duchesne and its tributaries is diverted and used for irrigation above the station.

Artificial control.—None.

Accuracy.—Fair.

Cooperation.—Maintained in cooperation with the State of Utah.

The following discharge measurement was made by J. C. Dort:

July 25, 1911: Gage height, 2.38 feet; discharge, 538 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of Duchesne River at Myton, Utah, for 1911.

[J. E. Parsons, observer.]

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			2.0	382	1.45	206	2.50	605	1.9	345	1.6	247
2			1.85	328	1.4	193	2.35	532	1.95	364	1.75	294
3			1.9	345	1.4	193	2.30	510	1.9	345	1.7	277
4			1.75	294	1.45	206	2.20	465	1.9	345	1.8	310
5			1.7	277	1.4	193	2.25	488	2.0	382	1.9	345
6			1.6	247	1.4	193	2.25	488	1.95	364	1.95	364
7			1.55	233	1.4	193	2.20	465	1.9	345	2.05	402
8			1.55	233	1.4	193	2.15	444	1.95	364	1.95	364
9			1.5	219	1.45	206	2.15	444	2.05	402	2.0	382
10			1.5	219	1.4	193	2.1	422	2.0	382	1.7	277
11			1.5	219	1.4	193	2.15	444	2.05	402	1.85	328
12			1.65	262	1.4	193	2.15	444	1.75	294	1.95	364
13			1.7	277	1.55	233	2.1	422	1.75	294	1.9	345
14			1.75	294	1.6	247	2.1	422	1.9	345	1.7	277
15			1.6	247	1.55	233	2.1	422	2.05	402	1.9	345
16			1.55	233	1.5	219	2.1	422	2.15	444	1.8	310
17			1.6	247	1.5	219	2.05	402	2.0	382	2.05	402
18			1.55	233	1.4	193	2.05	402	1.95	364	2.05	402
19			1.6	247	1.5	219	2.0	382	2.1	422	2.0	382
20			1.5	219	1.5	219	1.95	364	2.1	422	2.0	382

Daily gage height, in feet, and discharge in second-feet, of Duchesne River at Myton, Utah, for 1911—Continued.

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
21			1.5	219	1.5	219	1.95	364	2.1	422	1.95	364
22			1.5	219	1.5	219	1.9	345	2.1	422	1.9	345
23			1.55	233	1.5	219	2.0	382	1.8	310	1.9	345
24			1.6	247	1.6	247	2.0	382	1.8	310	1.85	328
25	2.4	555	1.5	219	1.65	262	2.0	382	1.95	364	1.8	310
26	2.5	605	1.5	219	1.7	277	2.0	382	2.05	402	1.8	310
27	2.4	555	1.5	219	1.8	310	2.0	382	1.8	310	1.85	328
28	2.2	465	1.5	219	2.8	770	2.0	382	1.75	294	1.95	364
29	2.1	422	1.4	193	2.25	488	2.0	382	1.75	294	2.0	382
30	2.05	402	1.4	193	2.3	510	2.0	382	1.65	262	2.0	382
31	2.05	402	1.4	193			1.9	345				382

NOTE.—There may have been some ice effect the last part of December. Daily discharge determined from a well-defined rating curve. Discharge estimated Dec. 31.

Monthly discharge of Duchesne River at Myton, Utah, for 1911.

[Drainage area, 2,750 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
August	382	193	246	0.090	0.10	15,100	B.
September	770	193	255	.093	.10	15,200	B.
October	605	345	423	.154	.18	26,000	A.
November	444	262	360	.131	.15	21,400	A.
December	402	247	343	.125	.14	21,100	B.
The period						98,800	

LAKE FORK CREEK NEAR MYTON, UTAH.

Location.—About 100 yards below a county highway bridge in sec. 21, T. 3 S., R. 2 W., Uinta special base and meridian, 3 miles above Myton, Utah, about half a mile above the junction of Lake Fork Creek and Duchesne River.

Records available.—July 3, 1900, to December 31, 1903; June, 1907, to November 30, 1910; July 26, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain gage. Several different gages and datums have been used previous to 1910. See Water-Supply Paper 289. The datum used in 1911 is 0.03 feet lower than that in 1910.

Channel.—Fairly permanent.

Discharge measurements.—Made from car and cable or by wading.

Winter flow.—Ice affects the relation of gage height to discharge for practically the entire winter period.

Diversions.—Several canals of the United States Indian Service and some privately owned canals take water from this stream above the station for irrigation.

Accuracy.—Excellent.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Lake Fork Creek near Myton, Utah, in 1911.

Date.	Hydrographer.	Discharge.	Gage height.
		Sec.-ft.	*Feet.*
July 26	J. C. Dort	216	2.66
27	do	157	2.38
Sept. 28	E. C. La Rue	69.6	1.90

Daily gage height, in feet, and discharge, in second-feet, of Lake Fork Creek near Myton, Utah, for 1911.

[James McAffee, observer.]

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage. height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	......	......	1.85	64	1.0	1.5	2.1	99	1.8	57	1.9	70
2	......	......	1.6	35	.9	1.0	2.0	84	1.8	57	1.9	70
3	......	......	1.55	31	1.05	1.8	1.9	70	1.8	57	1.9	70
4	......	......	1.6	35	.9	1.0	......	93	1.8	57	1.9	70
5	......	......	1.3	10	.9	1.0	2.2	116	1.8	57	1.9	70
6	......	......	1.25	7.5	.9	1.0	2.1	99	1.8	57	1.9	70
7	......	......	1.2	5.0	.9	1.0	1.9	70	1.8	57	1.95	......
8	......	......	1.1	2.0	1.05	1.8	......	70	1.8	57	1.95	......
9	......	......	1.15	3.5	......	1.4	1.9	70	1.8	57	2.0	......
10	......	......	1.0	1.5	.9	1.0	1.9	70	1.8	57	2.0	......
11	......	......	.9	1.0	.9	1.0	2.0	84	1.8	57	2.0	......
12	......	......	.9	1.0	.9	1.0	1.95	77	1.8	57	2.0	......
13	......	......	.9	1.0	......	1.4	1.9	70	1.8	57	2.0	......
14	......	......	1.15	3.5	1.05	1.8	1.9	70	1.8	57	2.0	......
15	......	......	1.1	2.0	.9	1.0	......	70	1.8	57	2.1	......
16	......	......	1.1	2.0	.9	1.0	1.9	70	1.8	57	2.1	......
17	......	......	......	1.8	.95	1.2	1.9	70	1.8	57	2.1	......
18	......	......	1.0	1.5	1.1	2.0	1.9	70	......	70	2.1	......
19	......	......	1.15	3.5	1.0	1.5	1.9	70	2.0	84	2.1	......
20	......	......	.9	1.0	1.0	1.5	1.9	70	2.0	84	2.1	......
21	......	......	.9	1.0	1.0	1.5	1.8	57	1.9	70	2.1	......
22	......	......	......	1.5	1.0	1.5	1.8	57	1.9	70	2.15	......
23	......	......	1.1	2.0	1.15	3.5	1.8	57	1.9	70	2.15	......
24	......	......	1.75	52	1.0	1.5	1.8	57	1.8	57	2.35	......
25	......	......	1.4	17	1.0	1.5	1.8	57	1.9	70	2.4	......
26	2.7	228	1.1	2.0	1.1	2.0	1.8	57	......	70	......	......
27	2.4	156	1.0	1.5	......	36	1.8	57	1.9	70	2.4	......
28	2.15	108	1.1	2.0	1.9	70	1.8	57	1.9	70	2.4	......
29	2.0	84	1.15	3.5	1.6	35	1.8	57	1.9	70	2.4	......
30	2.1	99	1.0	1.5	1.6	35	1.8	57	1.9	70	2.4	......
31	1.9	70	1.0	1.5	......	......	1.8	57	......	......	......	......

NOTE.—Relation of gage heights to discharge probably affected by ice Dec. 7 to 31. Daily discharge determined from a well-defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Lake Fork Creek near Myton, Utah, for 1911.

[Drainage area, 475 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
August	64	1.0	9.6	0.020	0.02	590	B.
September	70	1.0	7.1	.015	.02	422	C.
October	116	57	70.6	.149	.17	4,340	A.
November	84	57	63.1	.133	.15	3,750	A.
December	....	....	70	.147	.17	4,300	C.
The period	....	....	....	....	....	13,400	

NOTE.—The mean monthly discharge for December was estimated because of ice, from the flow when the river was open during the first part of the month.

WHITE RIVER BASIN.

NORTH FORK OF WHITE RIVER NEAR BUFORD, COLO.

Location.—At Genier's ranch, 1½ miles above Buford, about sec. 3, T. 1 S., R. 91 W. No important tributary enters between the station and the mouth of the South Fork.

Records available.—May 24, 1910, to December 31, 1911. From July 18, 1903, to October 31, 1906, a gaging station was maintained by the United States Geological Survey just below Ute Creek, 5 miles above the present station. The records at the two points are very nearly comparable, as no important tributaries enter between.

Drainage area.—240 square miles (State engineer's report).

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge measurements.—Made from footbridge.

Diversions.—There is a court decree for a diversion of 1.6 second-feet from the North Fork above the station, but none below. There are decrees for diversions of 33 second-feet from tributaries entering above.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of North Fork of White River near Buford, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Sec.ft.	Sec.ft.			Sec.ft.	Sec.ft.
Feb. 6	C. L. Chatfield.......	0.72	190	Aug. 20	C. L. Chatfield.......	0.91	241
May 23	C. E. Turner........	2.00	609	Oct. 21	.....do...............	.78	192
July 5	C. L. Chatfield.......	1.40	397				

Daily gage height, in feet, of North Fork of White River near Buford, Colo., for 1911.

[Mrs. H. Genier, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	0.7	0.85	1.4	2.4	....	1.0	0.85	1.15	0.8	0.8
2	....	.7	.9	1.4	....	1.55	.95	.85	1.05	.8	.8
3	....	.7	.95	1.45	2.35	1.5	.9	.9	1.05	.75	1.25
4	....	.7	1.0	1.85	2.4	1.5	.9	.9	.9	.75	.8
5	0.75	.7	.95	2.3	....	1.4	.9	.85	1.55	.8	.8
6	.75	.7	.9	2.6	....	1.4	.9	.8	1.15	.8	.8
7	.75	.7	.8	2.55	2.45	1.4	.9	.8	1.05	.8	.8
8	.8	.7	.85	2.9	3.0	1.3	.9	.8	1.05	.8	.9
9	.85	.75	.85	3.0	2.8	1.3	.9	.8	1.0	.8	.85
10	.8	.75	.9	2.65	2.5	1.3	.9	.8	.95	.85	.85
11	.8	.8	....	2.1	2.45	1.2	.9	.8	.9	.85	.85
12	.75	.7	.85	2.1	2.35	1.2	.95	.8	.85	.85	.75
13	.75	.75	.75	2.3	2.4	1.2	.9	.9	.8	.85	.7
14	.7	.8	....	2.5	2.35	1.2	.9	.85	.8	.9	.7
15	.7	.7	.8	2.6	2.3	1.15	.9	.8	.8	.9	.7
16	.7	.7	....	2.5	2.45	1.1	.9	.8	.8	.9	.7
17	.75	.75	.75	....	2.3	1.1	.9	.8	.8	.85	.7
18	.8	.70	.85	2.35	2.3	1.1	.9	.8	.8	.9	.65
19	.8	.75	.9	2.3	2.3	1.1	.9	.8	.8	.85	.75
20	....	.75	1.1	2.0	2.15	1.1	....	.8	.75	.9	.9
21	....	.8	1.2	....	2.4	1.1	....	....	.8	.85	.9
22	....	.7	1.3	1.85	2.2	1.5	....	.75	.8	.8	.85
23	.8	.8	1.45	2.0	2.15	1.15	....	.75	.8	.8	.9
24	.8	.8	1.5	2.05	2.0	1.1	....	.75	.8	.8	.9
25	.75	.8	....	2.25	1.85	1.1	....	.75	.8	.8	.85
26	.75	.7	1.6	....	1.75	1.1	....	.8	.8	.8	.85
27	.7	.75	1.8	2.15	1.7	1.1	.9	.8	.8	.8	.85
28	.7	.7	2.0	1.9	1.6	1.1	.85	.8	.75	.75	.85
29	....	.7	1.95	1.95	1.5	1.1	.85	.85	.75	.75	.85
30	....	.75	1.6	2.05	1.5	1.0	.85	1.15	.7	.8	.8
31	....	.75	....	2.2	....	1.0	.85	....	.8	....	.8

Daily discharge, in second-feet, of North Fork of White River near Buford, Colo., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	190	187	220	408	836	488	262	220	315	208	208
2	190	187	233	408	836	468	248	220	280	208	208
3	190	187	248	428	813	448	233	233	280	198	352
4	190	187	262	592	836	448	233	233	233	198	208
5	198	187	248	790	836	408	233	220	468	208	208
6	198	187	233	931	836	408	233	208	315	208	208
7	198	187	208	907	860	408	233	208	280	208	208
8	208	187	220	1,080	1,130	370	233	208	280	208	233
9	220	198	220	1,130	1,030	370	233	208	262	208	220
10	208	198	233	956	883	370	233	208	248	220	220
11	208	208	233	700	860	333	233	208	233	220	200
12	198	187	220	700	813	333	248	208	220	220	198
13	198	198	198	790	836	333	233	208	208	220	187
14	187	208	198	883	813	333	233	220	208	233	187
15	187	187	208	931	790	315	233	208	208	233	187
16	187	187	208	883	860	297	233	208	208	233	187
17	198	198	198	883	790	297	233	208	208	220	187
18	208	187	220	813	790	297	233	208	208	233	178
19	208	198	248	790	790	297	233	208	208	220	198
20	208	198	297	656	722	297	233	208	198	233	233
21	208	208	333	656	836	297	262	208	208	220	233
22	208	187	370	592	745	448	233	198	208	208	220
23	208	208	428	656	722	315	233	198	208	208	233
24	208	208	448	678	656	297	233	198	208	208	233
25	198	208	448	768	592	297	233	198	208	208	220
26	198	187	488	768	550	297	233	208	208	208	220
27	187	198	571	722	529	297	233	208	208	208	220
28	187	187	656	613	488	297	220	208	198	198	220
29	....	187	634	634	448	297	220	220	198	198	220
30	....	198	488	678	448	262	220	315	187	208	208
31	....	198	....	745	....	262	220	....	208	....	208

NOTE.—Discharge for days for which gage heights are missing determined by interpolation and from climatologic reports.

Monthly discharge of North Fork of White River near Buford, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
February	220	187	199	11,066
March	208	187	194	11,944
April	656	198	314	18,678
May	1,130	408	747	45,955
June	1,130	448	766	45,568
July	488	262	345	21,191
August	262	220	234	14,398
September	315	198	214	12,754
October	468	187	236	14,509
November	233	198	214	12,712
December	352	178	215	13,230
The period	....	....	....	222,005

WHITE RIVER AT MEEKER, COLO.

Location.—At Van Cleave's ranch, half a mile southeast of Meeker, in sec. 23, T. 1 N., R. 94 W. Nearest tributary above is Curtis Creek; nearest tributary below is Sulphur Creek.

Records available.—April 12, 1904, to October 31, 1906; May 7, 1910, to November 30, 1911.

Drainage area.—634 square miles.

Gage.—Automatic recording gage.

Channel.—Practically permanent.

Discharge measurements.—Made from highway bridge.

Diversions.—There are court decrees for diversions of 186 second-feet from White River above the station, and 59 second-feet from tributaries entering above. Below there are decrees for diversions of 198 second-feet from White River.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of White River at Meeker, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 7	C. L. Chatfield	0.95	340	Aug. 18	C. L. Chatfield	0.98	368
May 22	C. E. Turner	1.9	1,170	19	.....do	.93	334
July 1	C. L. Chatfield	1.57	864	22	Chatfield and Ault	1.0	372
3	.....do	1.57	837	Oct. 12	C. L. Chatfield	1.1	437
8	.....do	1.42	679	19	.....do	1.03	386
Aug. 17	.....do	.93	339				

Daily gage height, in feet, of White River at Meeker, Colo., for 1911.

[Walter Van Cleave, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	0.8	1.05	0.85	1.15	1.6	2.45	1.5	0.9	0.9	1.15	1.1
2	.8	.9	.85	1.15	1.55	2.55	1.5	.85	.9	1.0	1.05
3	....	1.0	1.0	1.15	1.5	2.6	1.55	.8	.95	1.05	1.1
4	....	.95	1.1	1.2	1.6	2.6	1.55	.85	1.05	1.0	1.1
5	.85	.95	1.15	1.25	2.0	2.65	1.5	.8	1.0	1.35	1.05
6	.9	.95	1.15	1.2	2.3	2.8	1.4	.8	.95	1.6	1.0
7	.8	.95	1.15	1.15	2.3	2.85	1.4	.85	.9	1.35	1.1
8	....	.9	1.1	1.1	2.45	3.15	1.4	.8	.9	1.15	1.25
9	....	1.0	1.2	1.15	2.8	3.3	1.35	.85	.9	1.1	1.2
10	....	1.15	1.25	1.2	2.75	3.0	1.3	.8	.85	1.05	1.2
11	....	1.1	1.2	1.2	2.25	2.75	1.3	.85	.85	1.0	1.15
12	....	1.0	.9	1.15	2.15	2.75	1.25	.8	.8	1.05	1.1
13	....	.9	.8	1.0	2.3	2.75	1.2	.85	.85	1.1	1.1
14	....	.95	.9	1.05	2.35	2.65	1.2	.85	.9	1.1	....
15	....	.9	.85	.95	2.45	2.6	1.15	.9	.9	1.1	....
16	....	.8	.9	1.1	2.1	2.6	1.1	.9	.9	1.1	....
17	....	.95	1.0	1.0	2.25	2.45	1.05	.9	.8	1.05	1.1
18	....	.95	.9	1.0	2.25	2.4	1.05	.9	.8	1.05	1.05
19	.95	.95	.85	1.15	2.3	2.45	1.0	.9	.8	1.0	....
20	1.0	.85	.9	1.3	2.1	2.4	1.0	.9	.8	1.05	....
21	1.0	.8	.9	1.4	1.9	2.55	1.0	.95	.75	1.0	1.05
22	.9	.8	1.0	1.4	1.85	2.4	1.05	1.0	.8	1.15	1.1
23	1.0	.8	1.0	1.4	1.95	2.55	1.15	1.0	.8	1.2	1.05
24	1.0	.95	1.0	1.5	2.15	2.1	1.0	1.0	.8	1.15	....
25	1.0	.85	1.0	1.5	2.15	2.0	1.0	1.0	.8	1.1	....
26	1.0	.8	.85	1.6	2.25	1.8	1.0	1.0	.8	1.1	....
27	1.0	.8	.8	1.65	2.1	1.75	1.0	.95	.9	1.1	....
28	1.0	.8	.9	1.85	2.1	1.65	1.0	.9	.9	1.1	....
29	1.0	....	.9	1.9	2.15	1.55	1.0	.9	.9	1.05	....
30	1.2	....	.95	1.7	2.2	1.45	.95	.9	1.0	1.05	....
31	1.2	....	1.1	....	2.4	....	.9	.9	....	1.1	....

Daily discharge, in second-feet, of White River at Meeker, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	275	405	295	470	870	1,805	770	325	325	470	435
2	275	325	295	470	820	1,945	770	295	325	375	405
3	275	375	375	470	770	2,000	820	275	350	405	435
4	275	350	435	505	870	2,000	820	295	405	375	435
5	295	350	470	545	1,280	2,065	770	275	375	630	405
6	325	350	470	505	1,620	2,365	675	275	350	870	375
7	275	350	470	470	1,620	2,435	675	295	325	630	435
8	295	325	435	435	1,805	2,775	675	275	325	470	545
9	295	375	505	470	2,365	3,030	630	295	325	435	505
10	295	470	545	505	2,198	2.545	585	275	295	405	505

Daily discharge, in second-feet, of White River at Meeker, Colo., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11	295	435	505	505	1,560	2,198	585	295	295	375	470
12	295	375	325	470	1,445	2,198	545	275	275	405	435
13	295	325	275	375	1,620	2,198	505	295	295	435	435
14	325	350	325	405	1,680	2,065	505	295	325	435	435
15	325	325	295	350	1,805	2,000	470	325	325	435	435
16	325	275	325	435	1,390	2,000	435	325	325	435	435
17	325	350	375	375	1,560	1,805	405	325	275	405	435
18	325	350	325	375	1,560	1,740	405	325	275	405	405
19	350	350	295	470	1,620	1,805	375	325	275	375	405
20	375	295	325	585	1,390	1,740	375	325	275	405	405
21	375	275	325	675	1,170	1,945	375	350	260	375	405
22	350	295	375	675	1,120	1,740	405	375	275	405	435
23	375	295	375	675	1,225	1,560	470	375	275	505	405
24	375	350	375	770	1,445	1,390	375	375	275	470	405
25	375	295	375	770	1,445	1,280	375	375	275	435	405
26	375	275	295	870	1,560	1,070	375	375	275	435	405
27	375	375	275	920	1,390	1,020	375	350	325	435	405
28	375	375	325	1,120	1,390	920	375	325	325	435	405
29	375	....	325	1,170	1,445	820	375	325	325	405	405
30	505	....	350	970	1,500	628	350	325	375	405	405
31	505	....	435	....	1,740	....	325	325	....	435	....

NOTE.—Discharge for days for which gage heights are missing determined by interpolation and from climatologic reports.

Monthly discharge of White River at Meeker, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	....	....	338	20,777
February	470	275	337	18,736
March	545	275	371	22,800
April	1,170	350	594	35,316
May	2,365	770	1,461	89,807
June	3,030	628	1,836	109,263
July	820	325	515	31,676
August	375	275	318	19,567
September	405	260	311	18,496
October	870	375	449	27,600
November	....	....	428	25,497
The period	....	....	....	419,535

SOUTH FORK OF WHITE RIVER NEAR BUFORD, COLO.

Location.—At Shepherd's ranch, 7 miles above Buford, about sec. 7, T. 2 S., R. 90 W. Nearest tributary a small creek which enters from the east just below the station.

Records available.—July 25, 1903, to October 31, 1906; June 1, 1910, to October 31, 1911.

Drainage area.—148 square miles (measured from Hayden's atlas).

Gage.—Vertical staff.

Channel.—Fairly permanent.

Discharge measurements.—Made from highway bridge during high water and by wading at ordinary stages.

Diversions.—There are no court decrees for diversions from the South Fork above the station, but below there is a decree for 5.4 second-feet. There is a decree for a diversion of 9.2 second-feet from tributaries entering above the station.

Winter flow.—Ice causes backwater and the records are discontinued during the winter months.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of South Fork of White River near Buford, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 6	C. L. Chatfield	0.40	128	Aug. 21	Chatfield and Ault	0.50	143
May 23	C. E. Turner	2.25	580	Oct. 22	....do	.40	119
July 6	C. L. Chatfield	1.60	405				

Daily gage height, in feet, of South Fork of White River near Buford, Colo., for 1911.

[Hugh Jones, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		0.2	0.2	0.6	4.6		0.7	0.3	0.4
2		.2	.3		4.9	2.0	.7	.3	.4
3		.2	.4		5.0	2.0	.6	.3	.6
4		.2	.2	.8	5.2	1.9	.6	.3	.9
5		.2	.4	1.0	5.7	1.8	.5	.3	1.1
6		.2		1.3	5.8	1.7	.5	.3	1.1
7	0.4	.2		1.7	6.3	1.6	.5	.3	1.0
8	.3	.2	.5	2.3	6.5	1.5	.5	.3	.5
9	.3	.2			6.7	1.5	.5	.3	.4
10	.3	.2		1.8		1.4	.4	.3	.4
11	.3	.2		1.7	5.4	1.4	.4	.3	.4
12	.2	.2		1.8	5.8	1.3	.4	.3	.4
13	.2	.2			5.0	1.3	.4	.3	.4
14	.2	.2	.2		4.8	1.3	.4	.3	.4
15	.2	.2	.2	1.7		1.2	.4	.3	.4
16	.3	.1		1.8		1.2	.3	.3	.4
17	.3	.1		2.2		1.0	.3	.3	.4
18	.3	.2	.5	2.4		1.0	.2	.3	.4
19	.3	.2		3.0	4.9	1.0	.2	.3	.4
20	.3	.2			4.1	1.0	.2	.3	.4
21	.4	.2		2.4	4.6	1.0	.5	.3	.4
22	.4	.2	.6	2.0	4.5	1.0	.4	.3	.4
23	.4	.2		2.3	3.8	1.0	.3	.3	.4
24	.4	.2		2.4	3.7	1.0	.2	.3	.4
25	.4	.2		3.2	3.6	1.0	.4	.3	.4
26	.4	.2	.7	3.5		1.0	.4	.3	.4
27	.4	.2	.8		3.5	1.0	.4	.3	.4
28	.2	.2	.9	3.8	3.3	1.0	.4	.3	.4
29		.2	1.0		3.0	.9	.4	.3	
30		.2	.9	4.0	2.0	.8	.4	.3	
31		.2		4.5		.8	.4		

Daily discharge, in second-feet, of South Fork of White River near Buford, Colo., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	125	90	90	165	1,361	511	186	107	125
2	125	90	107	165	1,469	511	186	107	125
3	125	90	125	165	1,505	511	165	107	165
4	125	90	90	208	1,579	484	165	107	231
5	125	90	125	255	1,764	457	144	107	279
6	125	90	125	327	1,801	430	144	107	279
7	125	90	125	430	1,991	404	144	107	255
8	107	90	144	595	2,077	378	144	107	144
9	107	90	144	595	2,153	378	144	107	125
10	107	90	144	457	1,991	352	125	107	125
11	107	90	144	430	1,653	352	125	107	125
12	90	90	144	457	1,801	327	125	107	125
13	90	90	144	457	1,505	327	125	107	125
14	90	90	90	457	1,433	327	125	107	125
15	90	90	90	430	1,433	303	125	107	125
16	107	75	90	457	1,433	303	107	107	125
17	107	75	90	567	1,433	255	107	107	125
18	107	90	144	624	1,433	255	90	107	125
19	107	90	144	807	1,469	255	90	107	125
20	107	90	144	807	1,183	255	90	107	125

Daily discharge, in second-feet, of South Fork of White River near Buford, Colo., for 1911—Continued.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
21	125	90	144	624	1,361	255	144	107	125
22	125	90	165	511	1,325	255	125	107	125
23	125	90	165	595	1,077	255	107	107	125
24	125	90	165	624	1,041	255	90	107	125
25	125	90	165	872	1,006	255	125	107	125
26	125	90	186	972	1,006	255	125	107	125
27	125	90	208	972	972	255	125	107	125
28	90	90	231	1,077	905	255	125	107	125
29	....	90	255	1,077	807	231	125	107	125
30	....	90	231	1,148	511	208	125	107	125
31	....	90	....	1,325	....	208	125	....	125

NOTE.—Discharge for days for which gage heights are missing determined by interpolation and from climatologic reports.

Monthly discharge of South Fork of White River near Buford, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
February	125	90	113	6,274
March	90	75	89	5,474
April	255	90	145	8,644
May	1,325	165	602	36,996
June	2,153	511	1,416	84,254
July	511	208	325	19,958
August	186	90	129	7,928
September	107	107	107	6,367
October	279	125	144	8,882
The period	....	....	....	184,777

PRICE RIVER BASIN.

PRICE RIVER NEAR HELPER, UTAH.

Location.—At settlement known locally as Spring Glenn, in sec. 25 or 36, T. 13 S., R. 9 E., Salt Lake base and meridian, 2½ miles south of Helper, Utah, about 2½ miles above the diversion dam of the Price River Irrigation Co., and 300 feet west of the main line of the Denver & Rio Grande Railroad, 4 miles below mouth of White Creek.

Records available.—February 21, 1904, to December 31, 1911.

Drainage area.—530 square miles.

Gage.—Vertical staff on left bank.

Channel.—Shifting during sudden floods.

Discharge measurements.—Made from cable and car.

Winter flow.—Relation of gage height to discharge not seriously affected by ice.

Diversions.—Records indicate the amount of water available for the Price River Irrigation Co. and for the canals for the town of Price, which take out a few miles below the station.

Accuracy.—Good.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Price River near Helper, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 21	G. H. Canfield	3.66	436	July 23	J. C. Dort	2.90	81.4
21	.....do	3.82	526	Sept. 15	.....do	2.70	40.0
28	.....do	3.16	155				

Daily gage height, in feet, of Price River near Helper, Utah, for 1911.

[Ada Ostberg, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	3.1	2.7	3.4	3.5	3.6	2.9	2.8	2.6	3.2	2.9	2.8
2	2.6	2.9	2.7	3.4	3.5	3.6	2.9	2.7	2.6	3.2	2.9	2.8
3	2.6	2.8	2.7	3.5	3.6	3.6	2.9	2.7	2.6	3.1	2.9	2.8
4	2.6	2.9	2.7	3.4	3.6	3.6	2.9	2.7	2.6	2.9	2.8	2.8
5	2.6	2.9	2.8	3.4	3.8	3.5	2.8	2.7	2.7	2.9	2.8	2.8
6	2.6	2.9	2.8	3.3	3.9	3.5	2.8	2.7	2.7	2.9	2.8	2.8
7	2.6	2.8	2.9	3.3	3.9	3.4	2.8	2.7	2.7	2.9	2.8	2.8
8	2.6	2.8	2.9	3.2	4.0	3.4	2.8	2.7	2.6	2.9	2.8	2.8
9	2.6	2.7	3.0	3.2	4.1	3.4	2.8	2.7	2.6	2.9	2.9	2.8
10	2.7	2.7	3.0	3.2	4.1	3.4	2.8	2.7	2.6	2.9	2.9	2.8
11	2.6	2.8	3.5	3.2	4.0	3.3	2.8	2.7	2.6	2.9	2.9	2.9
12	2.6	2.8	3.4	3.2	4.0	3.3	2.8	2.7	2.7	2.9	2.9	2.9
13	2.6	2.8	3.2	3.2	4.0	3.3	2.8	2.7	2.7	2.9	2.9	3.0
14	2.6	2.8	3.0	3.2	4.0	3.3	2.9	2.7	3.35	2.9	2.9	3.0
15	2.6	2.8	3.0	3.2	4.0	3.2	2.9	2.7	3.35	2.9	2.9	2.9
16	2.6	2.7	3.4	3.2	3.9	3.45	2.9	2.7	2.7	2.9	2.9	2.9
17	2.6	2.7	3.7	3.2	3.9	3.3	2.9	2.7	2.7	2.9	2.9	2.9
18	2.7	2.7	3.3	3.2	4.0	3.65	3.35	2.7	2.7	2.9	2.9	2.9
19	2.7	2.7	3.4	3.2	4.0	3.4	3.25	2.7	2.6	2.9	2.9	2.9
20	2.8	2.8	3.7	3.2	3.9	3.3	2.9	2.7	2.6	2.9	2.9	2.8
21	2.8	2.8	3.8	3.2	3.9	3.3	3.0	2.7	2.6	2.9	2.9	2.8
22	2.8	2.8	3.6	3.2	3.8	3.2	3.0	2.7	2.6	2.9	2.9	2.8
23	2.8	2.7	3.4	3.2	3.8	3.2	2.9	2.65	2.6	2.9	2.9	2.8
24	2.8	2.7	3.4	3.3	3.7	3.2	2.9	2.65	2.6	2.9	2.9	2.8
25	2.8	2.7	3.4	3.4	3.7	3.2	2.9	2.6	2.6	2.9	2.9	2.8
26	2.8	2.7	3.3	3.5	3.7	3.1	2.9	2.6	3.8	2.9	2.8	2.8
27	2.7	2.7	3.2	3.5	3.6	3.1	2.8	2.6	4.6	2.9	2.8	2.7
28	2.7	2.7	3.2	3.6	3.6	3.0	2.8	2.6	3.2	2.9	2.8	2.7
29	2.8	....	3.2	3.6	3.6	3.0	2.8	2.6	3.7	2.9	2.7	2.7
30	2.9	....	3.4	3.6	3.6	2.9	2.8	2.6	3.2	2.9	2.7	2.7
31	3.3	....	3.5	....	3.6	....	2.8	2.6	....	2.9	....	....

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 1 to Jan. 9.

Daily discharge, in second-feet, of Price River near Helper, Utah, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	20	137	40	259	318	384	82	59	25	170	82	59
2	20	82	40	259	318	384	82	40	25	170	82	59
3	20	59	40	318	384	384	82	40	25	137	82	59
4	20	82	40	259	384	384	82	40	25	82	59	59
5	20	82	59	259	534	318	59	40	40	82	59	59
6	20	82	59	210	619	318	59	40	40	82	59	59
7	20	59	82	210	619	259	59	40	40	82	59	59
8	20	59	82	170	710	259	59	40	25	82	59	59
9	20	40	107	170	810	259	59	40	25	82	82	59
10	40	40	107	170	810	259	59	40	25	82	82	59
11	25	59	318	170	710	210	59	40	25	82	82	82
12	25	59	259	170	710	210	59	40	40	82	82	82
13	25	59	170	170	710	210	59	40	40	82	82	107
14	25	59	107	170	710	210	82	40	234	82	82	107
15	25	59	107	170	710	170	82	40	234	82	82	82
16	25	40	259	170	619	288	82	40	40	82	82	82
17	25	40	456	170	619	210	82	40	40	82	82	82
18	40	40	210	170	710	420	234	40	40	82	82	82
19	40	40	259	170	710	259	190	40	25	82	82	82
20	59	59	456	170	619	210	82	40	25	82	82	59
21	59	59	534	170	619	210	107	40	25	82	82	59
22	59	59	384	170	534	170	107	40	25	82	82	59
23	59	40	259	170	534	170	82	82	25	82	82	59
24	59	40	259	210	456	170	82	82	25	82	82	59
25	59	40	259	259	456	170	82	25	25	82	82	59
26	59	40	210	318	456	137	82	25	534	82	59	59
27	40	40	170	318	384	137	59	25	1,350	82	59	40
28	40	40	170	384	384	107	59	25	170	82	59	40
29	59	....	170	384	384	107	59	25	456	82	40	40
30	82	....	259	384	384	82	59	25	170	82	40	40
31	210	....	318	....	384	....	59	25	....	82	....	40

NOTE.—Daily discharge Jan. 1 to Jan. 9 estimated, because of ice, from climatologic records and run-off in adjacent drainage areas.

Monthly discharge of Price River near Helper, Utah, for 1911.

[Drainage area, 530 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	210	20	42.5	0.080	0.09	2,610	C.
February	137	40	56.9	.107	.11	3,160	B.
March	534	40	202	.381	.44	12,400	A.
April	384	170	225	.425	.47	13,400	A.
May	810	318	558	1.05	1.21	34,300	A.
June	420	82	236	.445	.50	14,000	A.
July	234	59	81.6	.154	.18	5,020	A.
August	59	25	36.7	.069	.08	2,260	A.
September	1,350	25	128	.242	.27	7,620	A.
October	170	82	89.5	.169	.19	5,500	A.
November	82	40	73.1	.138	.15	4,350	B.
December	107	40	64.2	.121	.14	3,950	B.
The year	1,350	20	150	.283	3.83	109,000	

PRICE RIVER AT WOODSIDE, UTAH.

Location.—At the Denver & Rio Grande Railroad bridge crossing Price River at Woodside, in secs. 9 and 16, T. 18 S, R. 14 E., Salt Lake base and meridian, about 8 miles below a proposed diversion dam for an irrigation project, and about 15 miles above the junction with Green River.

Records available.—October 1, 1909, to December 31, 1911.

Drainage area.—1,500 square miles.

Gage.—Distance from a fixed point on the bridge to water surface is measured daily.

Channel.—Composed largely of quicksand.

Diversions.—A few small tributaries enter Price River between the dam site and the station.

Discharge measurements.—Made from upper side of railroad bridge.

Winter flow.—Relation of gage height to discharge probably affected by ice during the winter months.

Accuracy.—Because of the shifting character of the stream bed and as only two measurements were made during 1911, estimates of daily and monthly discharge can not be made.

Cooperation.—Data for this station supplied by Mr. Horace W. Sheley, consulting engineer, Salt Lake City, Utah. The location of station and methods of collecting data and making estimates have been approved by the United States Geological Survey.

Discharge measurements of Price River at Woodside, Utah, in 1911.

Date	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 28	Canfield and Sheley	13.87	300
July 23	J. C. Dort	14.26	115

Daily gage height, in feet, of Price River at Woodside, Utah, for 1911.

[D. P. Adams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	....	8.5	10.4	9.45	9.4	10.05	10.45	10.95
2	....	9.1	10.5	9.45	9.65	10.0	10.45	11.05
3	....	9.4	10.4	9.35	9.55	9.95	10.55	11.15
4	....	9.3	10.2	9.55	9.4	10.05	10.55	11.35
5	....	9.65	9.95	9.6	9.3	10.05	10.55	11.45
6	....	9.85	9.75	9.7	9.2	10.2	10.6	11.45
7	....	9.95	10.0	9.75	9.15	10.2	10.65	11.55
8	....	10.1	9.9	9.9	9.05	10.15	10.7	11.55
9	....	10.25	9.75	9.95	9.0	10.25	10.75	11.65
10	....	10.3	9.7	9.85	9.0	10.35	10.85	11.65
11	....	10.3	8.8	9.9	8.85	10.35	10.9	11.55
12	....	10.3	9.1	9.95	8.95	10.4	10.95	11.45
13	....	10.3	9.55	9.95	9.1	10.45	11.05	11.45
14	....	10.3	9.9	10.05	9.15	10.5	11.05	10.95
15	....	10.3	10.05	10.1	9.2	8.65	11.05	10.9
16	....	10.35	9.6	10.05	9.25	9.4	11.05	....
17	....	10.4	9.2	10.05	9.35	9.95	11.05	....
18	....	10.4	8.85	10.0	9.35	9.6	9.95	....
19	....	10.4	9.35	10.05	9.4	9.55	10.7	....
20	....	10.45	9.35	10.0	9.45	9.6	10.6	....
21	....	10.5	9.35	9.95	9.45	9.6	10.2	....
22	....	10.3	9.3	9.9	9.55	9.35	9.75	....
23	....	10.2	8.8	9.95	9.65	9.8	10.55	....
24	....	10.3	8.8	9.9	9.7	10.0	10.45	....
25	....	10.35	8.75	9.85	9.8	10.05	10.75	....
26	....	10.4	9.55	9.7	9.85	10.05	9.3	....
27	....	10.15	9.85	9.65	9.8	10.15	10.1	....
28	....	10.35	9.75	9.55	9.8	10.2	10.3	....
29	9.75	....	9.4	9.5	9.9	10.3	10.55	....
30	5.9	....	9.15	9.5	9.95	10.35	10.8	....
31	7.65	....	9.25	....	10.05	....	10.9	....

SAN RAFAEL RIVER BASIN.

SAN RAFAEL RIVER NEAR GREEN RIVER, UTAH.

Location.—At the county bridge near the J. C. Morris ranch, on the main road from Green River, Utah, to Hankesville, Utah, about 16 miles southwest from Green River, Utah, in sec. 27, T. 22 S., R. 16 E., Salt Lake base and meridian.

Records available.—May 5, 1909, to December 31, 1911.

Drainage area.—1,690 square miles.

Gage.—Vertical staff attached to downstream side of right crib abutment of bridge.

Channel.—Shifting; frequent discharge measurements are necessary.

Discharge measurements.—Made by wading at low water and from cable at high stages.

Winter flow.—Affected by ice.

Diversions.—Water is diverted above the station for irrigation in Castle Valley. No water is diverted below the station.

Accuracy.—Poor, owing to shifting character of stream bed and lack of discharge measurements.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of San Rafael River near Green River, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 30	G. H. Canfield	1.09	101
July 22	J. C. Dort	1.96	121

Daily gage height, in feet, of San Rafael River near Green River, Utah, for 1911.

[E. F. Marshall, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.8	3.55	1.6	2.4	1.6	3.6	2.1	1.25	0.9	5.0	1.35
2	1.8	2.25	1.6	1.9	1.45	3.8	2.2	1.2	.8	2.85	1.45
3	1.8	2.65	1.55	1.85	1.45	3.7	1.95	1.1	.8	3.65	1.35
4	1.8	2.4	1.65	2.15	1.75	3.4	2.2	1.05	.8	5.25	1.4
5	1.8	2.6	1.75	1.9	2.35	3.6	2.1	.95	.75	6.15	1.35
6	1.8	2.25	1.65	1.9	3.25	4.0	2.05	.95	.7	4.6	1.25
7	1.8	2.05	1.65	1.75	3.7	4.05	1.9	.9	.7	3.4	1.3
8	1.8	2.1	1.75	2.05	3.65	3.7	1.75	.9	.65	2.8	1.2
9	1.8	1.85	1.85	1.9	3.95	3.7	1.6	.9	.6	2.45	1.3
10	2.45	1.75	2.05	1.8	3.8	3.8	1.5	.9	.6	1.8	1.25
11	5.0	1.65	2.2	1.75	3.95	3.7	1.4	.9	.6	1.5	1.25
12	3.7	1.7	2.05	1.65	3.35	3.5	1.35	.9	.6	1.6	1.25
13	2.9	1.75	1.75	1.55	2.9	3.55	1.35	2.2	.6	1.5	1.25
14	2.4	1.65	1.65	1.7	2.55	3.25	1.25	2.1	1.7	1.7	1.25
15	2.2	1.75	1.65	1.55	2.8	3.9	1.2	1.7	1.4	1.6	1.25
16	1.6	1.8	1.75	1.45	3.05	3.8	1.25	1.45	1.9	1.55	1.25
17	1.5	1.65	1.75	1.65	2.9	3.7	1.25	1.25	1.75	1.45	1.25
18	1.25	1.55	1.9	1.55	3.05	4.15	1.05	1.15	1.55	1.7	1.25
19	1.35	1.55	1.8	1.65	2.95	4.1	1.15	1.05	1.8	1.65	1.35
20	1.45	1.75	1.75	1.55	3.05	3.55	1.65	1.05	1.4	1.55	1.55
21	1.55	1.65	2.1	1.45	2.9	3.4	1.85	.95	1.05	1.65	1.5
22	1.55	1.65	1.75	1.35	2.8	3.3	1.7	.9	1.0	1.45	1.55
23	1.45	1.55	1.65	1.45	3.1	3.4	1.6	3.55	.9	1.25	1.5
24	1.55	1.6	1.7	1.45	3.4	3.15	1.7	2.4	1.1	1.45	1.45
25	1.5	1.65	2.1	1.7	3.8	3.25	1.4	1.9	.95	1.65	1.35
26	1.4	1.65	1.75	1.8	3.8	3.05	1.3	1.55	1.05	1.65	....
27	1.45	1.65	1.65	2.1	3.65	2.8	2.5	1.3	.95	1.4	....
28	1.6	1.75	1.55	1.95	3.35	2.7	2.35	1.2	2.15	1.65	....
29	1.9	....	1.45	1.95	3.2	2.6	1.9	1.1	3.75	1.4	....
30	2.8	....	1.2	1.8	3.05	2.4	1.4	1.05	5.6	1.35	....
31	2.6	....	2.35	....	3.35	....	1.45	1.15	....	1.25	....

NOTE.—River frozen over Nov. 26 to Dec. 31, during which period relation of gage heights to discharge was probably affected by ice.

Daily discharge, in second-feet, of San Rafael River near Green River, Utah, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	102	649	142	272	142	670	144	59	50	1,560	64
2	102	240	142	178	128	760	166	57	50	339	70
3	102	336	137	172	128	714	121	55	50	663	64
4	102	272	148	221	159	586	166	54	50	1,760	67
5	102	322	159	178	261	670	144	52	50	2,580	64
6	102	240	148	178	528	862	136	52	50	1,320	59
7	102	202	148	159	714	877	114	50	50	544	61
8	102	212	159	202	692	688	97	50	50	322	57
9	102	172	172	178	835	688	82	50	50	226	61
10	284	159	202	165	760	740	74	50	50	102	59
11	1,550	148	230	159	835	688	67	50	50	74	59
12	714	153	202	148	566	590	64	50	50	82	59
13	412	159	159	137	412	614	64	166	50	74	59
14	272	148	148	153	309	483	59	144	92	92	59
15	230	159	148	137	380	792	57	92	67	82	59
16	142	165	159	128	460	740	59	70	114	78	59
17	132	148	159	148	412	688	59	59	97	70	59
18	112	137	178	137	460	939	54	56	78	92	59
19	119	137	165	148	428	908	56	54	102	87	64
20	128	159	159	137	460	614	87	54	67	78	78
21	137	148	212	128	412	544	108	52	54	87	74
22	137	148	159	119	380	502	92	50	52	70	78
23	128	137	148	128	476	544	82	614	50	59	74
24	137	142	153	128	586	445	92	214	55	70	70
25	132	148	212	153	760	483	67	114	51	87	64
26	123	148	159	165	760	308	61	78	54	87	....
27	128	148	148	212	692	322	238	61	51	67	....
28	142	159	137	185	566	292	202	57	155	87	....
29	178	....	128	185	510	264	114	55	714	67	....
30	380	....	108	165	460	214	67	54	2,070	64	....
31	322	....	261	....	566	....	70	56	....	59	....

NOTE.—Daily discharge determined from curves drawn through 1910 and 1911 discharge measurements and parallel to a well-defined curve for 1912. Daily discharge, Nov. 26–30, estimated at 65 second-feet.

Monthly discharge of San Rafael River near Green River, Utah, for 1911.

[Drainage area, 1,690 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,550	102	224	0.133	0.15	13,800	B.
February	649	137	196	.116	.12	10,900	A.
March	261	108	164	.097	.11	10,100	A.
April	272	119	163	.096	.11	9,700	A.
May	835	128	492	.291	.34	30,300	B.
June	939	214	608	.359	.40	36,200	B.
July	238	54	98.8	.059	.07	6,080	B.
August	614	50	88.0	.052	.06	5,410	B.
September	2,070	50	152	.090	.10	9,040	B.
October	2,580	59	356	.211	.24	21,900	B.
November			64.1	.038	.04	3,810	C.
December			a 60.0	.036	.04	3,690	C.
The year	2,580		222	.131	1.78	161,000	

a Estimated.

HUNTINGTON CREEK NEAR HUNTINGTON, UTAH.

Location.—At Cunha ranch, about 7 miles northwest of Huntington, Utah, in sec. 6, T. 17 S., R. 8 E., Salt Lake base and meridian.

Records available.—May 3, 1909, to December 31, 1911.

Drainage area.—158 square miles.

Gage.—Vertical staff in two sections.

Channel.—Shifting at extreme high stages.

Discharge measurements.—Made by wading at low stages and from a cable and car at high stages.

Floods.—Extremely high floods occasionally occur at this station in July and August.

Point of zero flow.—On September 4 it was determined that there would be no flow past the station if the stage were to fall below about 1.5 feet. Control will change.

Winter flow.—Ice affects relation of gage height to discharge at times during winter months.

Diversions.—Above all diversions (except Cunha's ditch) and below all main tributaries.

Artificial control.—A small storage reservoir on Huntington Creek above the station controls the distribution of the flow to a slight extent.

Accuracy.—Fair, except for high stages.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Huntington Creek near Huntington, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 22 a	G. H. Canfield	2.75	43.6	Aug. 23 a	Leonard Tanner	2.80	45.9
May 10	Leonard Tanner	4.25	436	Sept. 4 a	J. C. Dort	2.74	39.5
June 16	do	3.90	284	4 a	Leonard Tanner	2.74	40.7
July 11 a	do	3.30	128	Oct. 21 a	do	2.55	26.5

a Made by wading.

Daily gage height, in feet, of Huntington Creek near Huntington, Utah, for 1911.

[Joseph Cunha, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0		2.8		3.8	4.1	3.5	3.0	2.7	2.6	2.8	
2		2.75	2.8		3.9	4.0	3.5	3.0	2.7	2.6	2.7	
3			2.8		3.9	4.1	3.5	3.0	2.7	2.6	2.8	
4			2.85	2.9	3.95	4.15	3.5	3.0	2.7	2.6	2.7	
5				2.8	4.0	4.15	3.4	3.0	2.7	2.6	2.8	
6	3.0		2.9	2.8	4.0	4.05	3.4	3.0	2.7	2.6	2.7	
7				2.8	3.95	4.05	3.4	3.0	2.8	2.6	2.8	
8				2.8	3.9	4.15	3.4	3.0	2.8	2.6	2.7	
9		2.75	2.9	2.85	3.9	4.15	3.3	3.0	2.8	2.6	2.8	
10		2.75	2.9	2.85	3.9	4.15	3.3	3.0	2.8	2.6	2.7	3.2
11	3.0	2.75	2.8	2.85	3.85	4.1	3.3	3.0	2.8	2.6	2.8	
12				2.85	3.9	4.0	3.4	3.0	2.8	2.6	2.8	3.3
13				2.85	3.95	4.0	3.4	3.0	2.7	2.6	2.8	
14	3.0			2.85	3.85	4.0	3.3	3.0	2.7	2.6	2.8	3.3
15				2.8	3.85	4.0	3.3	3.0	2.7		2.8	
16	2.8			2.9	3.95	3.9	3.2	3.0	2.7		2.9	3.4
17			2.9	2.95	3.95	3.9	3.2	3.0	2.7		3.0	3.6
18		2.85	2.9	2.95	3.95	3.7	3.3	3.0	2.7		3.0	3.7
19	2.8	2.85	2.9	2.95	3.85	3.7	3.2	3.0	2.7			3.8
20		2.85	2.7	2.95	3.85	3.7	3.3	2.9	2.7			4.0
21			2.8	2.95	3.95	3.6	3.3	2.9	2.6	2.8		4.0
22			2.75	2.95	3.95	3.7	3.3	2.9	2.6	2.8		4.2
23			2.7	3.2	3.95	3.6	3.2	2.8	2.6	2.7		4.4
24			2.75	3.2	4.05	3.55	3.2	2.8	2.6	2.8		4.5
25	2.65		2.7	3.3	4.0	3.5	3.1	2.8	2.6	2.7		4.6
26			2.8	3.3	4.05	3.5	3.1	2.8	2.6	2.85		4.7
27			2.75	3.4	3.95	3.4	3.1	2.8	2.6	2.7		4.8
28	2.65	2.8	2.75	3.5	4.0	3.4	3.1	2.8	2.6	2.8		5.0
29			2.8	3.6	4.0	3.4	3.2	2.8	2.6	2.7		5.0
30			2.75	3.7	4.0	3.4	3.1	2.8	2.6	2.8		5.0
31			2.8		4.0		3.1	2.7		2.7		5.0

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 1 to Feb. 28 and Nov. 1 to Dec. 31. Gage heights Oct. 1–31 questionable.

Daily discharge, in second-feet, of Huntington Creek near Huntington, Utah, for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	47	50	251	364	167	71	38
2	47	52	285	323	167	71	38
3	47	55	285	364	167	71	38
4	52	58	304	386	167	71	38
5	55	47	323	386	143	71	38
6	58	47	323	344	143	71	38
7	58	47	304	344	143	71	47
8	58	47	285	386	143	71	47
9	58	52	285	386	122	71	47
10	58	52	285	386	122	71	47
11	47	52	268	364	122	71	47
12	49	52	285	323	143	71	47
13	51	52	304	323	143	71	38
14	52	52	268	323	122	71	38
15	54	47	268	323	122	71	38
16	56	58	304	285	103	71	38
17	58	64	304	285	103	71	38
18	58	64	304	221	122	71	38
19	58	64	268	221	103	71	38
20	38	64	268	221	122	58	38
21	47	64	304	193	122	58	29
22	42	64	304	221	122	58	29
23	38	103	304	193	103	47	29
24	42	103	344	180	103	47	29
25	38	122	323	167	86	47	29
26	47	122	344	167	86	47	29
27	42	143	304	143	86	47	29
28	42	167	323	143	86	47	29
29	47	193	323	143	103	47	29
30	42	221	323	143	86	47	29
31	47		323		86	38	

NOTE.—Daily discharge determined from a fairly well defined rating curve for all stages. Discharge estimated for days for which gage heights are missing.

Monthly discharge of Huntington Creek near Huntington, Utah, for 1911.

[Drainage area, 160 square miles]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			30	0.188	0.22	1,840	D.
February			40	.250	.26	2,220	D.
March	58	38	49.4	.308	.36	3,040	C.
April	221	47	79.3	.496	.55	4,720	B.
May	344	251	296	1.85	2.13	18,200	B.
June	386	143	275	1.72	1.92	16,400	B.
July	167	86	121	.756	.88	7,440	A.
August	71	38	62.5	.390	.45	3,840	A.
September	47	29	36.8	.230	.26	2,190	B.
October			25	.156	.18	1,540	C.
November			25	.156	.17	1,490	D.
December			20	.125	.14	1,230	D.
The year	386		88.9	.556	7.52	64,200	

NOTE.—The mean monthly discharges for January, February, November, and December were estimated because of ice. October was estimated because of probable incorrect gage readings by observer.

HUNTINGTON CREEK NEAR CASTLEDALE, UTAH.

Location.—About 5½ miles east of the town of Castledale and about 6 miles southeast of Huntington, in sec. 33, T. 18 S., R. 9 E., Salt Lake base and meridian; about 4 miles above the entrance of Cottonwood Creek.

Records available.—May 12, 1911, to December 31, 1911.

Drainage area.—350 square miles.

Gage.—Vertical staff.

Channel.—Sand and gravel; likely to shift during high water.

Discharge measurements.—High-water measurements made from car and cable; low-water measurements by wading.

Point of zero flow.—On September 5 it was determined that there would be no flow past the station if the stage were to fall below about 1.5 feet. Control will probably change.

Winter flow.—During the winter months the relation of gage height to discharge is at times affected by ice.

Diversions.—The station is located below all diversions.

Accuracy.—Good.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Huntington Creek near Castledale, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 12	Leonard Tanner	3.12	132	Aug. 19	Leonard Tanner	1.75	8.7
June 26	do	2.45	63.3	Sept. 5	J. C. Dort	1.70	4.76
July 26	do	2.18	30.5	5	Leonard Tanner	1.70	5.01
Aug. 4	do	1.80	11.6				

Daily gage height, in feet, of Huntington Creek near Castledale, Utah, for 1911.

[Elmer Jeffs, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	....	2.15	1.85	1.75	....	1.8	1.85
2	....	....	2.2	1.75	1.75	1.8	1.8	1.8
3	....	....	3.0	....	....	1.8	1.85	1.9
4	....	....	2.9	1.8	1.75	1.9	1.9	....
5	....	....	2.65	1.7	1.7	1.9	....	1.85
6	....	....	2.4	....	1.7	1.9	1.85	1.85
7	....	....	2.5	1.8	1.65	1.8	1.85	1.85
8	....	....	1.9	1.75	1.65	1.9	1.8	1.85
9	....	....	1.9	1.7	1.7	1.85	1.85	....
10	....	....	1.9	1.7	1.75	1.8	1.8	2.8
11	....	....	1.85	1.8	1.8	1.8	1.8	2.75
12	3.1	....	1.85	....	1.8	1.8	....	2.75
13	....	....	1.8	....	1.7	1.9	....	2.75
14	....	....	1.8	2.8	1.7	1.9	....	2.85
15	....	....	1.75	1.8	1.7	....	1.8	2.8
16	....	....	....	1.7	....	....	1.9	....
17	....	....	1.75	1.8	....	....	1.85	2.8
18	....	....	1.75	1.7	1.7	....	1.85	2.8
19	....	....	1.8	1.7	1.75	1.9	1.8	2.8
20	....	....	1.8	1.75	1.75	1.9	1.8	2.8
21	....	....	1.8	3.8	1.7	1.8	1.9	2.85
22	....	....	1.9	1.85	1.75	1.8	1.8	2.85
23	....	....	....	1.75	1.75	1.9	1.8	....
24	....	....	....	1.8	1.7	1.9	1.8	....
25	....	....	....	1.8	1.7	1.8	1.8	2.8
26	....	2.45	2.5	1.8	1.7	1.8	....	2.8
27	3.0	2.4	2.6	....	1.75	1.8	1.85	1.75
28	....	2.25	2.95	1.7	1.75	1.9	1.85	1.75
29	....	2.2	2.0	1.75	4.2	1.8	1.85	1.75
30	....	2.2	....	1.75	2.6	1.9	1.85	2.7
31	....	....	1.9	1.8	....	1.85	....	....

NOTE.—Relation of gage height to discharge probably affected by ice Dec. 9–31.

Daily discharge, in second-feet, of Huntington Creek near Castledale, Utah, for 1911.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	32	13	7.5	41	10
2	....	36	7.5	7.5	10	10
3	....	117	9	7.5	10	13
4	....	105	10	7.5	16	16
5	....	77	5	5	16	14
6	....	53	7.5	5	16	13
7	....	62	10	3.5	10	13
8	....	16	7.5	3.5	16	10
9	....	16	5	5	13	13
10	....	16	5	7.5	10	10
11	....	13	10	10	10	10
12	....	13	38	10	10	10
13	....	10	65	5	16	10
14	....	10	93	5	16	10
15	....	7.5	10	5	16	10
16	....	7.5	5	5	16	16
17	....	7.5	10	5	16	13
18	....	7.5	5	5	16	13
19	....	10	5	7.5	16	10
20	....	10	7.5	7.5	16	10
21	....	10	234	5	10	16
22	....	16	13	7.5	10	10
23	....	28	7.5	7.5	16	10
24	....	39	10	5	16	10
25	....	50	10	5	10	10
26	58	62	10	5	10	12
27	53	72	7.5	7.5	10	13
28	40	111	5	7.5	16	13
29	36	22	7.5	301	10	13
30	36	19	7.5	72	16	13
31	....	16	10	....	13	....

NOTE.—Daily discharge determined from a rating curve fairly well defined below 3.5 feet on gage. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Huntington Creek near Castledale, Utah, for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July	117	7.5	34.5	2,120	B.
August	234	5	21.0	1,290	B.
September	301	3.5	18.2	1,080	B.
October	41	10	14.3	879	B.
November	16	10	11.8	702	B.
December [a]			10.0	615	D.
The period				6,790	

[a] Estimated.

COTTONWOOD CREEK NEAR ORANGEVILLE, UTAH.

Location.—At Johnson's ranch, in sec. 9 or 10, T. 18 S., R. 7 E., Salt Lake base and meridian, about 5 miles northwest of Orangeville.

Records available.—May 1, 1909, to December 31, 1911.

Drainage area.—240 square miles.

Gage.—Inclined staff.

Channel.—Shifting.

Discharge measurements.—Made by wading at low stages and from a cable and car at high stages.

Floods.—Short, severe floods occur at this station during August and September.

Point of zero flow.—On August 22, 1911, it was determined that there would be no flow past the gage if the stage were to fall below about 3 feet. Control will change.

Winter flow.—Relation of gage height to discharge affected by ice at times during the winter months.

Diversions.—Above all diversions except Johnson's ditch.

Accuracy.—Poor, because of shifting channel.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Cottonwood Creek near Orangeville, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 23[a]	G. H. Canfield	3.81	39.2	Aug. 22[b]	Leonard Tanner	4.05	34.2
May 8	Leonard Tanner	5.7	539.2	Sept. 11[b]	J. C. Dort	4.03	31.7
June 24	do	5.2	238.9	Oct. 13[b]	Leonard Tanner	3.94	26.7
July 19[b]	do	4.4	83.8				

[a] Wading under cable.

[b] Wading below cable.

NOTE.—The above measurements refer to the gage installed Mar. 22, 1910.

Daily gage height, in feet, of Cottonwood Creek near Orangeville, Utah, for 1911.

[Robert Johnson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	4.1	3.7	......	4.4	6.2	......	4.2	......	......	3.8	4.0
2	4.2	3.8	3.7	......	4.7	6.2	......	4.2	......	4.0	3.8	4.1
3	4.2	3.8	......	4.5	5.0	6.3	......	4.2	......	4.0	3.8	......
4	......	3.8	3.8	4.1	5.0	......	......	4.2	......	4.0	3.8	4.0
5	4.2	......	......	4.0	5.2	6.4	4.7	......	4.0	4.0	......	......
6	4.2	3.8	3.9	......	5.8	6.4	4.7	......	4.0	4.0	3.8	4.1
7	4.2	3.7	3.9	4.0	......	......	4.7	4.1	4.0	4.0	......	......
8	......	3.6	4.0	4.2	5.7	6.5	4.7	4.1	4.0	......	3.8	4.0
9	3.8	3.7	4.0	......	5.9	6.0	......	......	4.0	4.0	3.8	4.1
10	......	......	3.9	3.6	......	6.0	4.6	4.1	......	4.0	3.8	......
11	4.3	3.7	3.9	3.6	5.5	......	4.5	4.1	......	......	3.8	4.0
12	4.0	......	......	3.6	5.7	6.1	4.5	4.4	4.4	4.0	......	4.0
13	4.6	3.7	4.6	3.6	5.7	6.1	4.5	......	4.0	4.0	4.0	......
14	3.9	3.8	4.9	4.0	......	6.1	......	4.2	4.0	3.95	......	4.0
15	......	3.9	4.9	4.1	5.4	......	4.7	4.6	4.0	......	3.95	4.0
16	3.8	......	4.8	......	5.4	6.0	......	4.4	4.0	3.95	......	......
17	4.0	3.8	4.8	4.0	5.4	5.9	4.6	......	......	3.95	3.9	......
18	......	3.7	4.6	4.0	5.5	......	4.6	4.1	4.0	3.95	4.0	3.7
19	4.5	......	......	3.9	5.4	5.7	4.4	4.1	4.0	3.8	......	3.7
20	......	3.8	4.1	3.9	5.4	......	4.4	......	4.0	......	......	......
21	5.0	3.8	3.9	4.0	......	5.5	......	4.1	4.0	3.8	3.9	3.7
22	......	3.7	4.5	3.9	5.8	5.4	4.4	4.0	4.0	......	......	......
23	4.2	......	3.8	......	6.0	5.4	......	......	4.0	4.0	3.95	3.7
24	4.6	3.7	......	4.5	6.0	5.3	......	4.0	......	3.9	4.0	......
25	4.6	3.8	3.6	4.7	......	......	4.6	4.0	4.0	3.9	......	......
26	3.8	......	......	4.5	5.9	5.2	4.4	4.0	4.0	......	......	3.6
27	......	4.0	3.7	4.5	5.8	5.1	4.3	......	4.0	3.9	4.0	4.0
28	3.6	3.7	3.9	4.4	......	5.0	......	......	4.0	3.9	4.1	4.0
29	......	......	4.2	4.4	......	5.0	4.3	4.0	5.3	......	4.0	4.0
30	4.9	......	4.8	......	......	5.0	......	4.0	4.2	......	......	4.0
31	5.1	......	4.8	......	6.2	......	......	4.0	......	......	......	......

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Jan. 31, for several days in February, and about Nov. 13 to Dec. 31.

Daily discharge, in second-feet, of Cottonwood Creek near Orangeville, Utah, for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	64	34	192	114	592	160	43	31	37	21
2	40	34	163	192	592	146	43	31	31	21
3	40	37	136	294	628	132	43	31	31	21
4	40	40	64	294	646	118	43	31	31	21
5	40	43	54	363	664	102	41	31	31	21
6	40	46	54	574	664	102	39	31	31	21
7	34	46	54	556	682	102	37	31	31	21
8	29	54	77	538	700	102	37	31	31	21
9	34	54	52	610	520	94	37	31	31	21
10	34	46	29	538	520	85	37	40	31	21
11	34	46	29	472	538	70	37	50	31	21
12	34	104	29	538	556	70	60	60	31	26
13	34	163	29	538	556	70	52	31	31	31
14	40	260	54	486	556	86	43	31	28	30
15	46	260	64	433	538	102	85	31	28	28
16	43	226	59	433	520	94	60	31	28	27
17	40	226	54	433	485	85	48	31	28	26
18	34	163	54	468	450	85	37	31	28	31
19	37	114	46	433	415	60	37	31	21	30
20	40	64	46	433	380	60	37	31	21	28
21	40	46	54	504	345	60	37	31	21	26
22	34	136	46	574	310	60	31	31	26	27
23	34	40	91	646	310	68	31	31	31	28
24	34	34	136	646	275	76	31	31	26	31
25	40	29	192	628	258	85	31	31	26	31
26	47	32	136	610	240	60	31	31	26	31
27	54	34	136	574	205	50	31	31	26	31
28	34	46	114	580	175	50	31	31	26	37
29	......	77	114	584	175	50	31	275	26	31
30	......	226	114	588	175	48	31	43	24	31
31	......	226	......	592	......	46	31	......	22	......

NOTE.—Daily discharge determined from two poorly defined rating curves applicable Jan. 1 to May 30 and May 31 to Dec. 31, respectively. Discharge interpolated for days when the gage was not read.

Monthly discharge of Cottonwood Creek near Orangeville, Utah, for 1911.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			30	0.125	0.14	1,840	D.
February	64	34	39.1	.162	.17	2,170	D.
March	260	29	96.3	.401	.46	5,920	B.
April	192	29	82.4	.343	.38	4,900	B.
May	646	114	492	2.05	2.36	30,200	B.
June	700	175	456	1.90	2.12	27,100	C.
July	160	46	83.2	.347	.40	5,120	C.
August	85	31	40.1	.166	.19	2,470	A.
September	275	31	41.4	.173	.19	2,460	A.
October	37	21	28.1	.117	.14	1,730	A.
November	37	21	26.4	.108	.12	1,570	D.
December			25	.104	.12	1,540	D.
The year	700		117	.488	6.79	87,000	

NOTE.—The mean monthly discharges for January and December were estimated because of ice in the stream. Accuracy for February and November given low because of possible ice effect.

FERRON CREEK (UPPER STATION) NEAR FERRON, UTAH.

Location.—At the Peterson (formerly Christensen's) ranch, in sec. 35, T. 19 S., R. 6 E., Salt Lake base and meridian, about 5 miles northwest of Ferron and 1½ miles above the flour mill.

Records available.—May 6 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff and sloping gage. New sloping gage installed September 13, 1911, 150 feet below the staff, was used for records after that date.

Channel.—Probably shifts at high stages.

Discharge measurements.—Made from cable and car or at low stages by wading.

Point of zero flow.—On September 13 and October 8 it was determined that there would be no flow past the station if the stage were to fall below about 1 foot on the sloping gage. Control will probably change.

Winter flow.—Relation of gage height to discharge affected by presence of ice during the winter months.

Diversions.—Above all diversions.

Accuracy.—Fair.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Ferron Creek (upper station) near Ferron, Utah, in 1911.

Date.	Hydrographer.	Gage height (inclined gage).	Gage height (vertical staff gage).	Discharge.	Date.	Hydrographer.	Gage height (inclined gage).	Gage height (vertical staff gage).	Discharge.
		Feet.	*Feet.*	*Sec.-ft.*			*Feet.*	*Feet.*	*Sec.-ft.*
June 29	Leonard Tanner		3.3	134	Sept. 6	Leonard Tanner		2.64	18.2
July 23	do		2.98	78.6	Sept. 13	Dort and Tanner	2.10	2.82	30.8
Aug. 24	do		2.7	21.9	13	do	2.12	2.90	35.0
Sept. 6	J. C. Dort		2.64	18.2	Oct. 8	Leonard Tanner	1.86	2.61	19.6

NOTE.—Measurements prior to Sept. 13, 1911, refer to a vertical staff gage installed May 6, 1911. Measurements on and after Sept. 13, 1911, have also been referred to the inclined gage 150 feet downstream from the vertical gage.

Daily gage height, in feet, of Ferron Creek (upper station) near Ferron, Utah, for 1911.

[J. H. Christensen, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	4.2	3.2	2.8	2.65	2.0	1.7	2.0
2	....	4.1	3.15	2.8	2.65	1.95	1.7	....
3	....	4.25	3.1	2.7	2.65	1.9	....	....
4	....	4.35	3.1	2.7	2.65	1.85	1.7	1.95
5	....	4.35	3.1	2.7	2.65	1.9	1.75	....
6	4.5	4.2	3.1	2.7	2.65	1.85	....	2.35
7	4.45	4.1	3.1	2.7	2.65	1.9	1.7	....
8	4.25	4.25	3.05	2.7	2.65	1.85	....	....
9	4.3	4.05	3.0	2.7	2.6	1.85	....	2.0
10	4.0	4.0	2.95	2.7	2.6	1.9	2.0	....
11	3.9	4.05	2.9	2.7	2.6	1.85	1.9	2.35
12	3.9	4.05	2.9	2.9	2.7	1.8	....	....
13	3.85	4.05	2.9	2.7	2.1	1.8	1.85	2.4
14	3.9	4.15	2.9	2.7	2.0	1.8	....	....
15	3.85	4.0	2.9	4.0	1.9	1.8	1.3	....
16	3.95	4.6	2.9	3.9	1.9	1.75	....	2.45
17	3.95	3.9	2.9	2.7	1.9	1.85	....	....
18	3.95	3.95	2.9	2.7	1.85	1.8	1.35	2.45
19	3.85	3.9	2.9	2.7	1.85	1.6	2.25	....
20	3.75	3.95	2.9	2.7	1.85	1.55	2.2	2.45
21	3.9	3.85	2.9	2.65	1.85	1.55	....	....
22	4.1	3.8	2.9	2.7	1.85	1.75	2.1	2.35
23	4.35	3.65	2.9	2.7	1.85	1.65	....	2.15
24	4.25	3.6	....	2.7	1.85	1.8	....	....
25	4.15	3.5	....	2.7	1.85	1.8	2.1	1.95
26	3.95	3.45	....	2.7	1.85	1.75	....	....
27	3.9	3.4	2.8	2.7	2.22	1.8	1.85	1.9
28	3.95	3.35	2.8	2.7	1.9	1.8	....	2.8
29	4.15	3.3	2.8	....	2.5	1.7	1.85	2.7
30	4.3	3.3	2.8	....	2.75	1.7	....	....
31	4.4	....	....	....	....	1.75	....	2.45

NOTE.—Relation of gage height to discharge probably affected by ice Dec. 5 to 31. Observer reports ice present Nov. 27. A new gage was established at this station Sept. 13, 1911; after Sept. 12 all gage heights are from this new gage.

Daily discharge, in second-feet, of Ferron Creek (upper station) near Ferron, Utah, for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	319	102	63	20	27	8	27
2	....	294	96	63	20	24	8	24
3	....	332	91	55	20	20	8	22
4	....	360	91	55	20	17	8	20
5	....	360	91	55	20	20	11	....
6	380	319	91	55	20	17	10	....
7	366	294	91	55	20	20	8	....
8	332	332	86	55	20	17	14	....
9	346	282	81	55	17	17	20	....
10	269	269	76	55	17	20	27	....
11	246	282	71	55	17	17	20	....
12	246	282	71	71	23	14	18	....
13	234	282	71	55	34	14	17	....
14	246	306	71	55	27	14	9	....
15	234	269	71	164	20	14	2	....
16	258	408	71	147	20	11	2	....
17	258	246	71	23	20	17	2	....
18	258	258	71	23	17	14	3	....
19	234	246	71	23	17	6	45	....
20	212	258	71	23	17	6	42	....
21	246	234	71	20	17	6	38	....
22	294	223	71	23	17	11	34	....
23	360	193	71	23	17	8	34	....
24	332	184	69	23	17	14	34	....
25	306	166	67	23	17	14	34	....

Daily discharge, in second-feet, of Ferron Creek (upper station) near Ferron, Utah, for 1911—Continued.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	258	136	65	23	17	11	25	
27	246	128	63	23	44	14	17	
28	258	121	63	23	20	14	17	
29	306	114	63	22	74	8	17	
30	346	114	63	21	106	8	17	
31	353			20		11		

NOTE.—Daily discharge May 6 to Sept. 12 determined from three poorly defined rating curves applicable May 6 to June 25, June 26 to Aug. 14, and Aug. 15 to Sept. 12, respectively. Daily discharge Sept. 13 to Dec. 6 obtained from a well-defined curve. Discharge interpolated for days for which gage heights are missing. Daily discharge Dec. 5 to 31 estimated at 10 second-feet.

Monthly discharge of Ferron Creek (upper station) near Ferron, Utah, for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 6-31	380	212	286	14,700	B.
June	408	114	258	15,100	B.
July	102	63	73.3	4,510	B.
August	164	20	46.7	2,870	B.
September	106	17	17.3	1,030	C.
October	27	6	14.3	879	C.
November	45	2	18.1	1,080	D.
December			11.7	719	D.
The period				40,900	

FERRON CREEK NEAR FERRON, UTAH.

Location.—At Westenskow's ranch, about half a mile below the headgates of the North and South canals, and about 2½ miles above the town of Ferron, Utah; probably in sec. 7, T. 20 S., R. 7 E., Salt Lake base and meridian.

Records available.—April 28, 1909, to October 7, 1911.

Drainage area.—153 square miles.

Gage.—Gage readings are obtained by measuring down to the water surface from a fixed point on the footbridge.

Channel.—Practically permanent at medium stages.

Discharge measurements.—Made from a footbridge at gage during high water and by wading at low water.

Point of zero flow.—On September 12 it was determined that there would be no flow past the station if the stage were to fall below about 4 foot. Control may change.

Winter flow.—Ice forms at times during winter months.

Diversions.—Two large canals, the North and South, with a combined capacity of 100 second-feet, divert water above the station, and many small ditches take water both above and below the station.

Accuracy.—The discharge curve is fairly well defined but the estimates can be considered only fair because of diversions made above gage.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Ferron Creek near Ferron, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 23	G. H. Canfield	1.40	20.9
25	.....do	1.22	10.22
May 5	Leonard Tanner	2.60	114
June 30	.....do	.80	1.4

Daily gage height, in feet, of Ferron Creek near Ferron, Utah, for 1911.

[James Westenskow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	1.7	1.5	1.9	1.7	2.0	3.0	0.6	....	....	0.9
2	1.7	1.3	1.7	2.6	2.1	2.7	.6	....	....	.7
3	1.1	1.1	1.7	2.1	2.3	3.0	.6	....	....	.4
4	1.1	1.1	1.4	1.6	2.6	3.2	.5	....	....	.2
5	1.1	1.0	1.0	1.4	3.2	3.0	.5	....	....	.5
6	1.9	1.0	1.1	1.4	3.0	2.9	.5	....	....	.2
7	1.7	1.0	1.1	1.4	3.3	3.0	.5	....	....	1.2
8	1.5	1.0	1.5	1.5	3.4	3.0	....	....	....	....
9	1.5	1.0	1.6	1.5	3.6	2.7	....	....	....	....
10	1.1	1.0	2.0	1.4	3.6	3.4	1.0	....	....	....
11	1.1	1.0	1.2	1.3	3.6	2.7	.5	....	....	....
12	2.0	1.0	1.0	.9	2.8	2.3	....	....	....	....
13	2.0	1.3	.7	.9	2.0	2.7	....	....	....	....
14	2.2	1.1	.7	.9	2.6	3.0	1.4	....	....	....
15	2.2	.7	1.1	.6	2.4	2.7	....	4.0	....	....
16	2.4	1.5	1.3	.8	1.8	2.5	....	1.9	....	....
17	1.8	1.9	1.3	1.1	1.8	2.9	....	.8	....	....
18	1.7	1.1	1.3	1.2	2.1	2.9	....	.6	....	....
19	2.2	1.3	1.5	.9	2.0	2.6	.6	....	....	....
20	2.4	.8	.9	.9	1.8	2.1	....	....	....	....
21	2.4	.8	1.0	.7	1.9	2.9	.4	....	....	....
22	1.9	1.0	1.7	1.0	2.3	2.6	....	....	....	....
23	1.9	1.3	1.4	1.6	2.4	2.1	....	....	....	....
24	1.9	1.1	1.4	2.2	2.4	2.1	....	....	....	....
25	2.7	1.8	1.25	2.2	3.0	1.9	....	....	....	....
26	2.7	1.5	1.0	2.0	2.3	1.6	....	....	....	....
27	2.6	1.9	1.2	1.7	2.3	1.4	....	....	2.1	....
28	2.5	1.9	1.2	1.8	2.4	1.2	....	....	....	....
29	2.5	....	2.2	1.8	3.4	.7	....	....	3.5	....
30	2.5	....	2.4	1.8	3.2	.7	....	....	2.6	....
31	2.7	....	2.3	....	3.3	....	....	....	....	....

NOTE.—Relation of gage heights to discharge probably affected by ice Jan. 1 to Feb. 28. Channel dry on days for which gage heights are missing prior to Oct. 8.

Daily discharge, in second-feet, of Ferron Creek nevr Ferron, Utah, for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	56	42	64	150	0.5	0.0	0.0	2.5
2	42	114	72	123	.5	.0	.0	1.0
3	42	72	88	150	.5	.0	.0	.0
4	21	35	114	170	.2	.0	.0	.0
5	4.0	21	170	150	.2	.0	.0	.2
6	6.5	21	150	141	.2	.0	.0	.0
7	6.5	21	180	150	.2	.0	.0	10
8	28	28	190	150	.0	.0	.0	....
9	35	28	210	123	.0	.0	.0	....
10	64	21	210	190	4.0	.0	.0	....
11	10	15	210	123	.2	.0	.0	....
12	4.0	2.5	132	88	.0	.0	.0	....
13	1.0	2.5	64	123	.0	.0	.0	....
14	1.0	2.5	114	150	21	.0	.0	....
15	6.5	.5	96	123	.0	250	.0	....
16	15	1.5	49	105	.0	56	.0	....
17	15	6.5	49	141	.0	1.5	.0	....
18	15	10	72	141	.0	.5	.0	....
19	28	2.5	64	114	.5	.0	.0	....
20	2.5	2.5	49	72	.0	.0	.0	....
21	4.0	1.0	56	141	.0	.0	.0	....
22	42	4.0	88	114	.0	.0	.0	....
23	21	35	96	72	.0	.0	.0	....
24	21	80	96	72	.0	.0	.0	....
25	12	80	150	56	.0	.0	.0	....
26	4.0	64	88	35	.0	.0	.0	....
27	10	42	88	21	.0	.0	72	....
28	10	49	96	10	.0	.0	136	....
29	80	49	190	1.0	.0	.0	200	....
30	96	49	170	1.0	.0	.0	114	....
31	88	....	180	....	.0	.0	....	....

NOTE.—Daily discharge determined from a poorly defined rating curve.

Monthly discharge of Ferron Creek near Ferron, Utah, for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 2.5	154	D.
February			[a] 3.5	194	D.
March	96	1.0	25.5	1,570	B.
April	114	.5	30.1	1,790	C.
May	210	49	118	7,260	C.
June	190	1.0	107	6,370	C.
July	21	.0	9.0	55	D.
August	250	.0	9.9	609	D.
September	200	.0	17.4	1,040	D.
The period				19,000	

[a] Estimated.

FERRON CREEK NEAR CASTLEDALE, UTAH.

Location.—About 8 miles below the town of Ferron, Utah, and 4 miles south of Castledale, Utah, at a point known locally as Paradise, in sec. 35, T. 19 S., R. 8 E., Salt Lake base and meridian; 2 miles below the point of diversion of the Paradise canal.

Records available.—June 12, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Inclined staff on left bank.

Channel.—Shifting.

Discharge measurements.—Made from car and cable or by wading.

Point of zero flow.—On September 12 it was determined that there would be no flow past the station if the stage were to fall below about 4.2 feet. Control will change.

Winter flow.—Ice affects the relation of gage height to discharge during the winter months.

Diversions.—Below all diversions, except the Fred Anderson ditch.

Accuracy.—Fair only, because of shifting character of stream bed.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Ferron Creek near Castledale, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 30	Leonard Tanner	5.00	20.5	Sept 12	J. C. Dort	4.38	0.19
July 25	do	4.55	2.05	Oct. 5	Leonard Tanner	4.89	13.7
Aug. 25	do	4.40	.27				

NOTE.—Measurements made by wading.

Daily gage height, in feet, of Ferron Creek near Castledale, Utah, for 1911.

[Abinadi Olsen, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	4.85	4.35	4.35	4.8	4.8	4.75
2	....	4.9	4.3	4.35	4.55	5.0	4.75
3	....	4.85	4.35	4.35	4.65	4.8	5.0
4	....	4.85	4.35	4.35	4.9	4.8	5.0
5	....	4.55	4.35	4.35	4.9	4.85	4.95
6	....	4.45	4.35	4.35	5.0	4.85	4.9
7	....	4.35	4.35	4.35	5.0	4.8	4.9
8	....	4.15	....	4.35	5.0	4.85	4.8
9	....	4.15	....	4.35	5.0	4.85	4.8
10	....	4.35	....	4.35	5.0	4.8	4.8
11	....	4.35	....	4.35	4.95	4.8	4.85
12	5.75	4.45	....	4.35	4.95	4.8	4.8
13	5.65	4.5	....	4.35	4.9	....	4.8
14	5.95	4.35	....	4.35	4.95	4.65	4.85
15	5.95	4.4	6.05	4.35	4.95	5.1	4.8
16	5.65	4.35	5.45	4.35	4.9	5.2	4.75
17	5.55	4.3	4.95	4.45	4.85	5.1	5.0
18	6.1	4.4	4.45	4.45	4.85	5.0	5.0
19	6.85	5.35	4.4	4.55	4.85	4.95	5.0
20	5.95	4.45	4.35	4.55	....	4.8	....
21	5.65	4.35	4.35	4.6	....	5.0	....
22	5.55	4.4	4.4	4.55	4.8	4.9	4.6
23	5.6	4.35	4.35	4.55	4.8	....	....
24	5.55	4.35	4.4	4.55	4.8	4.9	....
25	4.95	4.55	4.4	4.55	4.8	4.8	....
26	4.85	4.55	4.4	4.55	4.8	5.15	....
27	4.9	4.5	4.35	4.65	4.8	4.5	....
28	4.95	4.55	4.35	4.65	4.8	4.85	....
29	4.95	4.6	4.35	5.75	4.8	4.8	....
30	4.95	4.45	4.35	6.95	4.8	4.8	....
31	....	4.5	4.35	....	4.8	....	....

NOTE.—Relation of gage heights to discharge probably affected by ice Nov. 28 to Dec. 31.

Daily discharge, in second-feet, of Ferron Creek near Castledale, Utah, for 1911.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	11.5	0.2	0.2	9.5	9.5
2	....	13.5	.2	.2	3.0	19
3	....	11.5	.2	.2	5.2	9.5
4	....	11.5	.2	.2	13.5	9.5
5	....	3.0	.2	.2	13.5	11.5
6	....	1.2	.2	.2	19	11.5
7	....	.2	.2	.2	19	9.5
8	....	.2	.1	.2	19	11.5
9	....	.2	.1	.2	19	11.5
10	....	.2	.0	.2	19	9.5
11	....	.2	.0	.2	16.2	9.5
12	122	1.2	.0	.2	16.2	9.5
13	104	2.0	.2	.2	13.5	7.0
14	158	.2	1.0	.2	16.2	5.2
15	158	.3	176.	.2	16.2	25
16	104	.2	68	.2	13.5	33
17	86	.2	16.2	1.2	11.5	25
18	185	.3	1.2	1.2	11.5	19
19	320	51	.3	3.0	11.5	16.2
20	158	1.2	.2	3.0	11.5	9.5
21	104	.2	.2	4.0	9.5	19
22	86	.3	.3	3.0	9.5	13.5
23	95	.2	.2	3.0	9.5	13.5
24	86	.2	.3	3.0	9.5	13.5
25	16.2	3.0	.3	3.0	9.5	9.5
26	11.5	3.0	.3	3.0	9.5	29
27	13.5	2.0	.2	5.2	9.5	2.0
28	16.2	3.0	.2	5.2	9.5	2.0
29	16.2	4.0	.2	122	9.5	2.0
30	16.2	1.2	.2	338	9.5	2.0
31	....	2.0	.2	....	9.5	....

NOTE.—Daily discharge determined from a fairly well-defined curve drawn through discharge measurements in 1911 and 1912. Discharge estimated for days for which gage heights are missing. Discharge Nov. 28–30 estimated as 2.0 second-feet.

Monthly discharge of Ferron Creek near Castledale, Utah, for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 12-30	320	11.5	97.7	3,680	B.
July	51	.2	4.2	258	C.
August	176	.0	8.6	529	C.
September	338	.2	16.7	994	B.
October	19	3.0	12.0	738	B.
November	33		12.6	750	C.
December			[a] 1.5	92	D.
The period				7,040	

[a] Estimated.

GRAND RIVER BASIN.

NORTH FORK OF GRAND RIVER NEAR GRAND LAKE, COLO.

Location.—Three miles southwest of Grand Lake, Colo., in sec. 13, T. 3 N., R. 76 W. Nearest tributary, Grand Lake outlet, enters some distance below; no tributaries for several miles above the station.

Records available.—July 29, 1904, to September 30, 1909; September 20, 1910, to December 31, 1911.

Drainage area.—107 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge measurements.—Made from highway bridge at the gage.

Winter flow.—Ice forms along the edges but springs keep the river open.

Diversions and storage.—There are court decrees for diversions of 716 second-feet from the headwaters above the station. Of this amount 525 second-feet are for diversion across the divide into the headwaters of the Cache la Poudre. There is also a reservoir decree for 19,000 acre-feet from the flood water.

Accuracy.—The estimates of discharge, which have been made only for days when the gage was read, should be reliable.

Cooperation.—During 1911 the station was maintained in cooperation with the United States Forest Service and the State engineer.

Discharge measurements of North Fork of Grand River near Grand Lake, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 20[a]	R. H. Fletcher	3.40	30.3	Sept. 8	C. L. Chatfield	3.62	43.0
Feb. 15[a]	do	2.42	27.6	15	H. B. Waha	3.63	47.7
Apr. 2[a]	do	3.50	37.0				

[a] Ice conditions.

Daily gage height, in feet, of North Fork of Grand River near Grand Lake, Colo., for 1911.

[T. O. Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				3.5	4.15							
2				3.5	4.2							
3					4.1							
4					4.02				3.8	3.8	3.78	
5								3.8				
6					4.6							
7											3.8	
8					4.7		4.6		3.62			
9					5.1							3.45
10					5.1							
11				3.5	4.8		4.5					
12								3.8		3.7		
13					4.9				3.65		4.5	
14							4.45					
15		2.42		3.6		6.4		3.7	3.63			3.4
16					5.2							
17				3.7								
18				3.6						3.75		
19				3.8					3.6			
20	3.4			3.7		5.6					3.5	
21				3.95	5.3							
22				3.92					3.6			
23			3.4			5.25		4.5				
24				4.0						3.73		
25				4.1							4.3	
26				4.1								
27				4.22		4.8					4.0	
28				4.2			4.02					
29				4.28								
30									3.64			
31			3.5									

NOTE.—Ice affected the gage heights from Jan. 1 to Apr. 2 and Nov. 13 to Dec. 31; gage read to top of ice.

Daily discharge, in second-feet, of North Fork of Grand River near Grand Lake, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		132						
2		145						
3		120						
4		104				65	65	63
5					65			
6		275						
7								65
8		315		275		47		
9		510						
10		510						
11	35	360		235				
12					65		55	
13		410				50		
14				218				
15	45		1,340		55	48		
16		570						
17	55							
18	45						60	
19	65					45		
20	55		810					
21	90	630						
22	84					45		
23			600		235			
24	100						58	
25	120							
26	120							
27	150		360					
28	145			104				
29	165							
30						49		
31								

NOTE.—Discharge determined from a well-defined rating curve.

GRAND RIVER NEAR GRANBY, COLO.

Location.—At Switzer's ranch, 4 miles east of Granby, about sec. 22, T. 2 N., R. 76 W. Nearest tributary enters from the south 1 mile above the station; Willow Creek enters Grand River 1 mile below the station.

Records available.—June 9, 1908, to July 23, 1911.

Drainage area.—484 square miles (measured from Hayden's atlas).

Gage.—Vertical and inclined staff.

Channel.—Practically permanent.

Discharge measurements.—Made from a car and cable 300 feet below the gage.

Winter flow.—The river is frozen entirely across for the four winter months; anchor ice also occurs.

Diversions and storage.—Between this station and that on the North Fork near Grand Lake there are court decrees for diversions of 23 second-feet from Grand River, 20 second-feet from the South Fork, and 51 second-feet from Stillwater Creek. There is also a reservoir decree for 31,000 acre-feet of the flood water of the North Fork.

Accuracy.—Conditions favor accurate results, and the estimates should be reliable.

Cooperation.—Station is maintained and the records for 1911 furnished by the State engineer.

Discharge measurements of Grand River near Granby, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 21[a]	R. H. Fletcher	2.50	67.9	Aug. 4	C. L. Chatfield	2.12	235
Feb. 15[a]	do	2.25	87.5	Sept. 8	do	1.80	143
Apr. 3	do	1.60	116				

[a] Ice conditions.

Daily gage height, in feet, of Grand River near Granby, Colo., for 1911.

[J. P. Switzer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.1	2.9	2.7	2.0	2.4	4.2	3.4		
2	2.1	2.9	2.7	1.9	2.85	4.3	3.3		
3	2.1	3.0	2.7	1.9	3.05	4.3	3.2		
4	2.1	3.0	2.7	1.8	3.2	4.3	3.0	2.1	
5	2.1	2.85	2.7	1.8	3.3	4.3	3.0		
6	2.1	2.7	2.7	1.8	3.3	4.45	3.0		
7	2.1	2.6	2.7	1.85	3.5	4.5	3.0		
8	2.1	2.6	2.7	1.9	3.5	4.45	3.0		1.8
9	2.15	2.6	2.7	1.8	3.65	4.4	3.0		
10	2.2	2.5	2.7	1.8	3.8	4.4	3.0		
11	2.25	2.5	2.8	1.8	3.7	4.3	3.0		
12	2.25	2.5	2.8	1.7	3.7	4.3	3.0		
13	2.25	2.4	2.95	1.7	3.6	4.2	2.9		
14	2.15	2.35	2.95	1.7	3.6	4.4	2.9		
15	2.3	2.35	2.95	1.7	3.6	4.65	2.9		
16	2.4	2.35	2.85	1.85	3.75	4.8	2.8		
17	2.5	2.4	2.85	1.9	3.9	4.7	2.8		
18	2.5	2.3	2.9	1.9	3.85	4.45	2.7		
19	2.5	2.35	2.9	1.9	3.65	4.1	2.7		
20	2.5	2.4	2.8	1.9	3.3	4.0	2.8		
21	2.5	2.5	2.8	1.9	3.25	3.85	2.8		
22	2.5	2.5	2.8	2.0	3.2	3.8	2.8		
23	2.5	2.4	2.8	2.15	3.4	3.7	2.9		
24	2.6	2.5	2.8	2.25	3.55	3.7			
25	2.8	2.5	2.8	2.3	3.6	3.55			
26	2.8	2.6	2.8	2.35	3.65	3.5			
27	2.8	2.6	2.5	2.4	3.8	3.5			
28	3.0	2.7	2.4	2.5	3.8	3.4			
29	3.0		2.3	2.5	3.8	3.4			
30	3.0		2.1	2.45	4.05	3.4			
31	3.0		2.0		4.2				

NOTE.—The gage heights from Jan. 1 to Mar. 28 were affected by ice.

Daily discharge, in second-feet, of Grand River near Granby, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	210	360	1,850	1,000		
2	180	585	2,000	925		
3	180	738	2,000	850		
4	150	850	2,000	700	240	
5	150	925	2,000	700		
6	150	925	2,220	700		
7	165	1,100	2,300	700		
8	180	1,100	2,220	700		150
9	150	1,250	2,150	700		
10	150	1,400	2,150	700		
11	150	1,300	2,000	700		
12	130	1,300	2,000	700		
13	130	1,200	1,850	625		
14	130	1,200	2,150	625		
15	130	1,200	2,520	625		
16	165	1,350	2,800	550		
17	180	1,500	2,600	550		
18	180	1,450	2,220	500		
19	180	1,250	1,720	500		
20	180	925	1,600	550		
21	180	888	1,450	550		
22	210	850	1,400	550		
23	260	1,000	1,300	625		
24	300	1,150	1,300	595		
25	320	1,200	1,150	565		
26	340	1,250	1,100	535		
27	360	1,400	1,100	505		
28	400	1,400	1,000	475		
29	400	1,400	1,000	445		
30	380	1,660	1,000	410		
31		1,850		375		

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge estimated July 24 to 31.

Monthly discharge of Grand River near Granby, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			65	4,000	D.
February			85	4,720	D.
March			115	7,070	D.
April	400	120	212	12,600	B.
May	1,850	360	1,160	71,300	B.
June	2,800	1,000	1,800	107,000	C.
July	1,000	375	620	38,100	B.
The period				245,000	

NOTE.—Discharge Jan. 1 to Mar. 31 was estimated from 2 discharge measurements and climatologic records.

GRAND RIVER AT SULPHUR SPRINGS, COLO.

Location.—At the bridge connecting the Denver, Northwestern & Pacific Railway station with the town of Sulphur Springs, in sec. 2, T. 1 N., R. 78 W. Nearest tributary, Beaver Creek, enters the river 2 miles below the station.

Records available.—July 22, 1904, to September 30, 1909; September 23, 1910, to December 31, 1911.

Drainage area.—946 square miles (measured from Hayden's atlas).

Gage.—Chain gage; datum the same as that of the gage used originally.

Channel.—Somewhat shifting.

Discharge measurements.—Made from bridge during high and ordinary stages, and by wading during low water.

Winter flow.—The river is frozen over during the winter months and discharge measurements are made to determine the winter flow.

Diversions.—Between this station and that near Granby there are court decrees for diversions of 100 second-feet from Grand River and 662 second-feet from intervening tributaries. There is also a reservoir decree for 31,300 acre-feet from the flood waters of Grand River.

Accuracy.—Owing to the shifting character of the channel the estimates of discharge can not be considered better than fair or, possibly, good.

Cooperation.—Station is maintained in cooperation with the United States Forest Service and the State engineer.

Discharge measurements of Grand River at Sulphur Springs, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 17	R. H. Fletcher	[a] 2.90	102	July 29	C. L. Chatfield	2.72	578
Feb. 14	do	[b] 2.70	103	Sept. 5	do	2.10	289
Apr. 3	do	2.09	330	13	H. B. Waha	1.97	228

[a] Ice present. Gage height to top of ice. [b] Ice present. Gage height to water surface.

Daily gage height, in feet, of Grand River at Sulphur Springs, Colo., for 1911.

[J. E. Wolfe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			2.72		2.95	5.7	4.85			2.2		
2			2.74		2.75	5.6		2.45	2.25	2.2		
3			2.7	2.09	2.65	5.4	4.6			2.2		
4			2.72		2.75	5.3				2.25	1.75	3.1
5					3.35	5.3	4.9	2.35	2.1	2.2	1.75	
6			2.72		3.95	5.25	4.6			2.2	1.8	
7			2.76		4.2		4.4	2.25		2.2	3.9	
8			2.76		4.15		4.2	2.25			1.85	
9			2.71		4.45		4.0	2.25			1.85	3.1
10			2.74		4.78			2.25			1.9	
11					4.2			2.2		2.2	4.15	3.1
12				1.9	4.0			2.25		2.2	4.85	
13				1.85	3.9				1.97	2.2	4.75	
14		2.7		1.75		5.65		2.3		2.1	4.75	
15		2.7		1.7		5.6		2.25		2.1	4.75	3.05
16		2.7						2.25			4.75	
17	2.9	1.65		1.95		5.45					4.75	
18		1.65		1.85		5.5				2.1	4.75	2.95
19		1.65		2.0			3.25	2.2		2.1	4.85	
20		1.65		2.1			3.2			1.9	4.7	
21		1.64		2.22			3.1	2.2		2.1		2.9
22		1.55		2.3				2.75		2.05		
23		1.6						2.65		1.9	2.85	
24				2.35						2.0		
25		1.74		2.6				2.5			2.85	
26				2.58				2.45			2.85	
27		1.72		2.68								2.9
28		1.7		2.75						1.95		
29				2.98		4.9	2.75	2.2		1.95		
30						4.9				1.9		2.85
31										1.85		

NOTE.—Gage heights Jan. 1 to Mar. 10, Nov. 7, and Nov. 11 to Dec. 31 affected by ice; gage read to top of ice; average thickness of ice Jan. 1 to Mar. 10 was 1.4 feet; average thickness of ice in November was 0.3 foot, and in December 1.2 feet.

Daily discharge, in second-feet, of Grand River at Sulphur Springs, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		745	3,670	2,500			330	
2		610	3,520		445	350	330	
3	286	550	3,220	2,200			330	
4		610	3,080				350	165
5		1,020	3,080	2,560	395	290	330	165
6		1,520	3,010	2,200			330	180
7		1,770		1,980	350		330	
8		1,720		1,770	350			198
9		2,040		1,570	350			198
10		2,420			350			215
11		1,770			330		330	
12	215	1,570			350		330	
13	198	1,480				240	330	
14	165		3,600		370		290	
15	150		3,520		350		290	
16					350			
17	232		3,300					
18	198		3,370				290	
19	250			965	330		290	
20	290			920			215	
21	338			850	330		290	
22	370				610		270	
23					550		215	
24	395						250	
25	520				470			
26	510				445			
27	568							
28	610						232	
29	766		2,560	610	330		232	
30			2,560				215	
31							198	

NOTE.—Daily discharge determined from a fairly well defined rating curve. Estimates made only for days when gage was read.

GRAND RIVER NEAR KREMMLING, COLO.

Location.—At the entrance to Gore Canyon 3 miles southwest of Kremmling, in sec. 23, T. 1 N., R. 81 W. Nearest tributary, Blue River, enters a mile below Kremmling.

Records available.—July 24, 1904, to December 31, 1911.

Drainage area.—2,380 square miles.

Gage.—Automatic recording gage, except during the winter months when a staff gage is read.

Channel.—Somewhat shifting; the bed scours at high stages and silts during low.

Winter flow.—Although the river freezes entirely across at the station, there was little if any backwater during 1911, as shown by discharge measurements made during the winter. Rapids below the station remained open and thus prevented backwater from ice.

Kremmling reservoir site.—The station is located at the site of the proposed Kremmling reservoir of the United States Reclamation Service. With a 200-foot dam at the mouth of Gore Canyon the capacity of the reservoir would be 2,200,000 acre-feet.

Diversions.—Between this station and that at Sulphur Springs there are court decrees for diversions of 34 second-feet from Grand River, and 2,315 second-feet from intervening tributaries exclusive of diversions for placer mining in the Blue River drainage.

Accuracy.—Although the channel is somewhat shifting, sufficient discharge measurements have been made to form a basis for reliable estimates of flow.

Cooperation.—Since 1910 this station has been maintained in cooperation with the State engineer.

Discharge measurements of Grand River near Kremmling, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 17[a]	R. H. Fletcher	1.00	412	Apr. 5	R. H. Fletcher	2.45	1,080
Feb. 9[a]	Fletcher and Russell	.70	399	July 25	C. L. Chatfield	5.45	1,940
13[a]	R. H. Fletcher	.80	424	Sept. 2	do	2.55	916

[a] Ice conditions.

Daily gage height, in feet, of Grand River near Kremmling, Colo., for 1911.

[H. C. Rogers, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.4	1.5	0.65	1.6	5.2	10.8	7.1	4.15	2.55	2.6	1.45	0.5
2	.55	1.15	.65	2.25	4.75	11.5	7.8	3.95	2.55	3.1	1.7	.75
3	.55	1.35	.65	2.35	4.5	11.7	9.7	3.8	2.6	2.9	1.35	.75
4	.6	.95	.7	2.75	4.7	11.4	9.9	3.7	2.7	2.7	1.25	.45
5	.75	.85	1.0	2.45	5.5	11.7	9.8	3.55	2.75	2.65	1.6	.8
6	.85	.85	1.35	2.25	6.3	11.8	10.7	3.4	2.65	3.5	1.2	.6
7	.8	.8	1.2	2.05	7.5	11.8	10.0	3.25	2.55	3.9	1.4	1.0
8	1.0	.75	1.45	1.4	8.4	12.1	9.2	3.15	2.45	3.45	1.55	1.15
9	.95	.7	2.05	1.75	9.2	12.5	8.6	3.0	2.35	3.3	1.5	.75
10	1.0	.6	1.55	2.05	9.8	12.5	8.0	3.0	2.25	2.95	1.6	1.05
11	.95	.6	2.6	2.0	10.3	11.6	7.3	3.35	2.2	2.75	.45	.9
12	.95	.7	1.6	1.8	8.8	11.4	6.9	3.95	2.15	2.6	.6	.8
13	.85	.75	1.3	1.7	8.4	11.7	6.8	3.7	2.05	2.45	.55	.75
14	.8	.75	1.3	1.4	8.8	11.4	6.5	3.4	2.05	2.35	1.4	.8
15	.8	.7	1.25	1.45	9.3	11.0	6.2	3.15	2.15	2.3	2.0	1.35
16	.8	.6	1.45	1.35	10.0	11.5	6.1	3.0	2.45	2.25	2.05	1.05
17	.8	.8	1.25	1.5	10.2	11.6	6.2	3.05	2.35	2.2	2.05	1.1
18	.85	.65	1.05	1.6	10.4	11.3	6.3	3.05	2.15	2.2	1.9	1.85
19	.8	.65	1.1	1.75	10.9	10.8	6.1	2.95	2.05	2.25	1.75	2.1
20	.7	.65	1.45	2.15	10.6	11.0	6.0	2.9	2.0	2.2	1.9	2.05
21	.85	.55	1.55	2.65	9.4	10.9	5.7	3.15	2.0	2.05	1.8	2.4
22	.8	.5	1.55	3.25	8.5	11.0	6.1	3.75	2.0	2.3	1.6	2.45
23	.7	.6	1.65	3.55	8.0	11.2	6.6	4.15	2.0	1.45	1.3	2.3
24	.7	.6	1.55	4.1	8.0	11.2	6.0	4.8	1.95	1.8	.55	2.25
25	.75	.6	1.25	4.1	8.6	9.5	6.5	4.15	1.9	1.95	.85	2.45
26	.9	.65	1.0	4.1	9.5	8.8	5.2	3.75	1.85	1.8	.85	2.35
27	.95	.6	1.05	4.6	10.0	8.2	5.2	3.45	1.85	1.8	.95	2.3
28	.95	.6	1.15	5.4	9.6	7.9	4.95	3.15	1.9	1.8	.9	2.15
29	.8		1.25	6.0	9.7	7.8	4.7	3.0	1.95	1.7	.55	1.95
30	1.15		1.65	5.6	10.0	7.5	4.5	2.85	2.0	1.75	.45	1.75
31	1.7		1.6		10.4		4.3	2.7		1.6		1.65

NOTE.—Ice present from Jan. 1 to Mar. 12 and Nov. 11 to Dec. 31, but discharge measurements showed little if any backwater. Gage heights Jan. 1 to Apr. 29 and Oct. 21 to Dec. 31 read on a staff gage; gage heights Apr. 30 to Oct. 20 recorded by automatic gage.

Daily discharge, in second-feet, of Grand River near Kremmling, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	330	590	380	620	2,130	6,350	2,950	1,430	905	920	578	350
2	360	502	380	860	1,900	7,100	3,400	1,360	905	1,070	650	402
3	360	552	380	940	1,800	7,350	4,950	1,300	920	1,010	552	402
4	370	452	390	1,100	1,980	7,000	5,050	1,270	950	950	528	340
5	402	428	465	1,030	2,250	7,350	5,000	1,220	965	935	620	415
6	428	428	552	980	2,730	7,500	5,850	1,160	935	1,200	515	370
7	415	415	515	920	3,460	7,500	5,150	1,120	905	1,340	565	465
8	465	402	550	720	4,150	7,850	4,380	1,080	875	1,180	606	502
9	452	390	550	830	4,850	8,350	3,910	1,040	845	1,130	590	402
10	465	370	550	920	5,400	8,300	3,480	1,040	815	1,020	620	478

Daily discharge, in second-feet, of Grand River near Kremmling, Colo., for 1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	452	370	550	900	5,900	7,150	3,020	1,150	800	965	500	440
12	452	390	550	840	4,500	6,900	2,760	1,360	785	920	400	415
13	428	402	540	800	4,100	7,300	2,520	1,270	755	875	450	402
14	415	402	540	720	4,450	6,850	2,520	1,160	755	845	565	415
15	415	390	528	730	4,900	6,400	2,360	1,080	785	830	740	400
16	415	370	578	700	5,550	7,000	2,310	1,040	875	815	755	400
17	415	415	528	750	5,750	7,150	2,360	1,060	845	800	755	400
18	428	380	478	780	5,950	6,750	2,420	1,060	785	800	710	400
19	415	380	490	830	6,550	6,150	2,310	1,020	755	815	665	400
20	390	380	578	980	6,200	6,400	2,250	1,010	740	800	710	400
21	428	360	605	1,100	4,950	6,250	2,090	1,080	740	755	680	380
22	415	350	605	1,300	4,150	6,300	2,310	1,290	740	830	620	380
23	390	370	635	1,420	3,800	6,550	2,580	1,430	740	578	540	380
24	390	370	605	1,620	3,800	6,550	2,250	1,680	725	680	500	380
25	402	370	528	1,620	4,250	4,800	2,520	1,430	710	725	428	350
26	440	380	465	1,620	5,050	4,150	1,860	1,290	695	680	428	350
27	452	370	478	1,820	5,550	3,700	1,860	1,180	695	680	452	350
28	452	370	502	2,220	5,150	3,500	1,750	1,080	710	680	440	350
29	415	....	528	2,550	5,200	3,450	1,640	1,040	725	650	360	350
30	502	....	635	2,330	5,500	3,200	1,560	995	740	665	340	350
31	650	....	620	....	5,900	....	1,480	950	....	620	....	350

NOTE.—Daily discharge Jan. 1 to Mar. 12 and Nov. 11 to Dec. 31 determined almost directly from the open-season rating curve except during short periods when the increased gage heights indicated the probability of backwater. Discharge Mar. 13 to Apr. 1, Apr. 6 to 30, and July 12 to Nov. 10 was determined from a well-defined curve. Discharge Apr. 2 to 5 and May 1 to July 11 determined by indirect method for shifting channels.

Monthly discharge of Grand River near Kremmling, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	650	330	426	26,200	B.
February	590	350	405	22,500	B.
March	635	380	525	32,300	B.
April	2,550	620	1,150	68,400	A.
May	6,550	1,800	4,440	273,000	A.
June	8,350	3,200	6,370	379,000	A.
July	5,850	1,480	2,930	180,000	A.
August	1,680	950	1,180	72,600	A.
September	965	695	804	47,800	A.
October	1,340	578	863	53,100	A.
November	755	340	562	33,400	B.
December	502	....	393	24,200	B.
The period	8,350	330	1,680	1,210,000	

GRAND RIVER AT GLENWOOD SPRINGS, COLO.

Location.—At Glenwood Springs, at the point where the discharge from the hot springs enters the river. No Name Creek enters Grand River about 2 miles above the station, and Roaring Fork enters one-half mile below.

Records available.—May 12, 1899, to December 31, 1911.

Drainage area.—4,520 square miles (measured from Wells map of Colorado).

Gage.—Automatic recording gage. Datum unchanged since 1900.

Channel.—Slightly shifting.

Discharge measurements.—Made from a car and cable stretched beneath the State Street Bridge, which crosses the river one-third mile below the gage.

Winter flow.—Ice never forms at the station, as the hot water from the springs keeps the water above the freezing point.

Artificial control.—The Shoshone power plant of the Central Colorado Power Co., 6 miles above Glenwood Springs, has sufficient pondage to withhold the flow of the river for a portion of the day during low-water periods.

Diversions.—Between this station and the one near Kremmling there are court decrees for a diversion of 13 second-feet from Grand River and 1,508 second-feet from the intervening tributaries.

Accuracy.—Except at high water, when the swiftness of the current makes it difficult to secure accurate discharge measurements, conditions are favorable for accurate results, and the records are considered excellent.

Cooperation.—During 1911 the station was maintained in cooperation with the United States Forest Service and the Central Colorado Power Co.

Discharge measurements of Grand River at Glenwood Springs, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 5	Russell and Wimmer.	3.20	679	June 14	W. B. Freeman	8.35	12,000
Feb. 25	R. H. Fletcher	2.85	504	Sept. 25	G. H. Russell	3.85	1,100
Mar. 9	Thos. Grieve	4.05	1,300	Oct. 14	C. L. Chatfield	4.15	1,350
25	E. O. Christiansen	3.75	1,110	Dec. 19	O. M. Wimmer	3.45	707
May 7	J. B. Stewart	6.76	6,340				

Daily gage height, in feet, of Grand River at Glenwood Springs, Colo., for 1911.

[H. H. French, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	4.2	3.35	3.8	5.6	8.2	6.3	4.9	4.2	4.2	3.8	2.9
2	3.0	3.8	3.35	4.0	5.4	8.6	6.3	4.8	4.2	4.4	3.8	2.9
3	3.0	3.6	3.35	4.1	5.2	8.6	7.0	4.7	4.2	4.4	3.8	2.95
4	3.1	3.5	3.3	4.2	5.2	8.6	7.4	4.6	4.2	4.3	3.6	3.2
5	3.2	3.5	3.5	4.2	5.4	8.6	7.2	4.6	4.2	4.4	3.6	3.0
6	3.35	3.45	3.6	4.4	6.0	8.8	7.6	4.5	4.2	4.8	3.8	3.0
7	3.3	3.45	3.6	4.2	6.6	8.8	7.5	4.4	4.2	4.9	3.7	3.0
8	3.3	3.3	3.8	4.0	7.0	9.0	7.1	4.4	4.2	4.8	3.6	3.0
9	3.35	3.3	4.0	4.0	7.4	9.0	6.8	4.3	4.0	4.6	3.8	3.1
10	3.45	3.2	4.1	4.0	7.7	9.0	6.6	4.2	4.0	4.4	3.8	3.3
11	3.6	3.3	4.0	4.0	7.8	8.7	6.4	4.4	4.0	4.4	3.8	3.6
12	3.5	3.45	4.0	4.0	7.2	8.6	6.2	4.6	4.0	4.2	3.7	3.4
13	3.35	3.6	3.8	4.0	7.0	8.6	6.0	4.6	4.0	4.2	3.5	3.4
14	3.4	3.5	3.6	3.9	7.2	8.4	6.0	4.5	4.0	4.1	3.7	3.3
15	3.35	3.45	3.6	3.8	7.4	8.2	5.8	4.4	4.0	4.0	3.7	3.4
16	3.4	3.45	3.6	3.8	7.8	8.5	5.8	4.3	4.1	4.0	3.7	3.4
17	3.3	3.4	3.6	3.8	7.8	8.3	5.8	4.3	4.1	4.0	3.8	3.4
18	3.3	3.4	3.8	3.8	8.0	8.2	5.8	4.3	4.0	4.0	3.8	3.5
19	3.3	3.35	3.7	4.0	8.2	8.2	5.8	4.2	4.0	4.0	3.8	3.3
20	3.3	3.35	3.6	4.0	8.1	8.2	5.8	4.2	3.9	4.0	3.8	3.3
21	3.3	3.3	3.6	4.3	7.5	8.3	5.6	4.2	3.9	3.8	3.9	3.3
22	3.2	3.2	3.8	4.5	7.1	8.2	5.6	4.6	4.0	3.7	4.0	3.3
23	3.2	3.2	3.8	4.8	6.9	8.2	5.9	4.8	4.0	3.8	3.9	3.3
24	3.1	3.25	3.8	5.0	7.0	7.8	5.9	5.0	4.0	3.8	3.8	3.3
25	3.3	3.35	3.8	5.0	7.2	7.5	5.6	5.0	3.8	3.8	3.6	3.35
26	3.45	3.3	3.8	5.0	7.7	7.2	5.5	4.8	3.8	3.8	2.9	3.4
27	3.4	3.3	3.7	5.2	7.8	6.8	5.4	4.6	3.8	3.8	3.35	3.4
28	3.45	3.35	3.6	5.4	7.8	6.6	5.4	4.4	3.9	3.8	3.15	3.4
29	3.5	....	3.6	5.8	7.8	6.6	5.2	4.4	3.9	3.9	2.9	3.4
30	3.8	....	3.7	5.8	7.9	6.4	5.1	4.3	4.0	3.9	2.85	3.45
31	4.1	....	3.7	....	8.0	....	5.0	4.2	....	3.8	....	3.45

Daily discharge, in second-feet, of Grand River at Glenwood Springs, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	510	1,490	690	1,030	3,770	11,600	5,250	2,540	1,490	1,490	1,030	470
2	510	1,030	690	1,240	3,390	13,400	5,250	2,380	1,490	1,780	1,030	470
3	510	860	690	1,360	3,030	13,400	7,200	2,230	1,490	1,780	1,030	490
4	550	790	660	1,490	3,030	13,400	8,450	2,080	1,490	1,630	860	600
5	600	790	790	1,490	3,390	13,400	7,800	2,080	1,490	1,780	860	510
6	690	755	860	1,780	4,560	14,300	9,150	1,930	1,490	2,380	1,030	510
7	660	755	860	1,490	6,000	14,300	8,800	1,780	1,490	2,540	940	510
8	660	660	1,030	1,240	7,200	15,200	7,500	1,780	1,490	2,380	860	510
9	690	660	1,240	1,240	8,450	15,200	6,600	1,630	1,240	2,080	1,030	550
10	755	600	1,360	1,240	9,500	15,200	6,000	1,490	1,240	1,780	1,030	660
11	860	660	1,240	1,240	9,900	13,800	5,500	1,780	1,240	1,780	1,030	860
12	790	755	1,240	1,240	7,800	13,400	5,000	2,080	1,240	1,490	940	720
13	690	860	1,030	1,240	7,200	13,400	4,560	2,080	1,240	1,490	790	720
14	720	790	860	1,130	7,800	12,500	4,560	1,930	1,240	1,360	940	660
15	690	755	860	1,030	8,450	11,600	4,160	1,780	1,240	1,240	940	720
16	720	755	860	1,030	9,900	13,000	4,160	1,630	1,360	1,240	940	720
17	660	720	860	1,030	9,900	12,100	4,160	1,630	1,360	1,240	1,030	720
18	660	720	1,030	1,030	10,700	11,600	4,160	1,630	1,240	1,240	1,030	790
19	660	690	940	1,240	11,600	11,600	4,160	1,490	1,240	1,240	1,030	660
20	660	690	860	1,240	11,200	11,600	4,160	1,490	1,130	1,240	1,030	660
21	660	660	860	1,630	8,800	12,100	3,770	1,490	1,130	1,030	1,130	660
22	600	600	1,030	1,930	7,500	11,600	3,770	2,080	1,240	940	1,240	660
23	600	600	1,030	2,380	6,900	11,600	4,360	2,380	1,240	1,030	1,130	660
24	550	630	1,030	2,700	7,200	9,900	4,360	2,700	1,240	1,030	1,030	660
25	600	690	1,030	2,700	7,800	8,800	3,770	2,700	1,030	1,030	860	690
26	755	660	1,030	2,700	9,500	7,800	3,580	2,380	1,030	1,030	470	720
27	720	660	940	3,030	9,900	6,600	3,390	2,080	1,030	1,030	690	720
28	755	690	860	3,390	9,900	6,000	3,390	1,780	1,130	1,030	575	720
29	790	....	860	4,160	9,900	6,000	3,030	1,480	1,130	1,130	470	720
30	1,030	....	940	4,160	10,300	5,500	2,860	1,630	1,240	1,130	450	755
31	1,360	....	940	....	10,700	....	2,700	1,490	....	1,030	....	755

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Grand River at Glenwood Springs, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1,360	510	701	43,100	B.
February	1,490	600	749	41,600	A.
March	1,360	660	942	57,900	A.
April	4,160	1,030	1,790	107,000	A.
May	11,600	3,030	7,910	486,000	A.
June	15,200	5,500	11,700	696,000	B.
July	9,150	2,700	5,020	309,000	A.
August	2,700	1,490	1,930	119,000	A.
September	1,490	1,030	1,280	76,200	A.
October	2,540	940	1,440	88,500	A.
November	1,240	450	915	54,400	A.
December	860	470	653	40,200	B.
The year	15,200	450	2,920	2,120,000	

GRAND RIVER NEAR PALISADES, COLO.

Location.—At the State bridge 2 miles above Palisades, about sec. 3, T. 11 S., R. 98 W. Nearest important tributary, Plateau Creek, enters about 6 miles above the station.

Records available.—April 9, 1902, to November 30, 1911.

Drainage area.—8,550 square miles.

Gage.—Chain gage; location and datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from bridge to which the gage is attached. Prior to 1906, measurements were made from the suspension bridge at Palisades where conditions were less favorable for accurate determination of discharge.

Winter flow.—The river usually freezes over a portion of the year, but except for slush and ice and an occasional thin ice cover, the effect of the gage heights is slight.

Diversions.—There are court decrees for diversions of 420 second-feet from Grand River and 2,500 second-feet from intervening tributaries between Palisades and the Glenwood Springs station. The proposed high line canal of the United States Reclamation Service will divert 700 second-feet 7 miles above the Palisades station. Below the station the Grand Valley Irrigation Co. has a diversion of 400 second-feet.

Accuracy.—Conditions favor accurate results, and the estimates should be reliable.

Cooperation.—During 1911 station was maintained in cooperation with the United States Reclamation Service, which furnished most of the field data.

Discharge measurements of Grand River near Palisades, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 9	C. L. Chatfield	13.08	2,170	Aug. 23	Harper and Page	13.65	3,220
24	E. O. Christensen	12.75	1,800	Sept. 28	Hoag and Page	13.20	2,360
May 10	S. O. Harper	18.30	15,600	Oct. 16	C. L. Chatfield	13.60	2,720
July 18	do	15.45	6,830				

Daily gage height, in feet, of Grand River near Palisades, Colo., for 1911.

[I. W. Penny, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.3	13.9	12.25	12.8	15.2	18.8	16.8	14.4	13.7	14.2	13.0	13.9
2	12.3	13.2	12.35	13.0	14.8	19.3	16.6	14.0	13.7	14.4	13.0	
3	12.3	12.9	12.1	13.3	14.6	19.4	16.6	13.8	13.4	14.2	13.0	
4	12.3	12.9	12.25	13.4	14.7	19.6	17.9	13.6	13.0	13.8	12.8	
5	12.5	12.8	12.6	13.6	15.1	19.7	17.6	13.4	12.8	16.6	12.8	
6	12.5	12.7	12.8	13.8	15.6	19.8	18.0	13.4	12.9	16.0	12.9	
7	12.5	12.6	13.2	13.6	16.5	20.0	18.4	13.3	12.9	15.2	12.8	
8	12.5	12.5	13.0	13.4	17.1	20.0	17.8	13.2	12.8	14.8	12.8	
9	12.5	12.45	13.1	13.3	18.2	20.1	17.1	13.2	12.7	14.6	12.8	
10	12.6	12.3	14.0	13.2	18.4	20.2	16.8	13.2	12.6	14.4	12.8	
11	15.2	12.3	14.1	13.2	18.0	19.8	16.5	13.3	12.7	14.1	13.0	
12	12.9	12.4	13.5	13.2	17.5	19.6	16.1	13.4	12.7	13.8	13.1	
13	12.6	12.45	13.0	13.2	17.2	19.8	15.8	13.2	12.6	13.6	12.9	
14	12.5	12.4	12.9	13.2	17.3	19.6	15.6	13.3	12.7	13.5	13.0	
15	12.6	12.35	12.8	12.9	17.4	19.6	15.4	13.2	12.8	13.5	12.9	
16	12.6	12.3	12.6	12.6	17.8	19.7	15.4	13.0	13.0	13.5	13.0	
17	12.4	12.25	12.6	12.4	18.2	19.3	15.6	13.1	12.8	13.4	13.0	13.9
18	12.45	12.3	12.6	12.6	18.6	19.2	15.4	13.0	13.0	13.4	12.8	
19	12.3	12.25	12.6	13.0	18.6	19.2	15.5	13.0	12.8	13.4	13.0	
20	12.3	12.2	12.6	13.2	18.6	19.2	15.5	13.1	12.8	13.3	13.0	
21	12.25	12.1	12.6	13.3	17.8	19.2	15.2	13.5	12.8	13.2	13.0	
22	12.25	12.1	12.6	13.6	17.2	19.1	15.7	13.2	12.9	13.0	12.8	
23	12.2	12.0	12.8	14.0	17.2	19.0	16.2	13.6	12.8	13.0	12.8	
24	12.25	12.1	12.8	14.1	17.0	19.0	16.0	13.8	13.0	12.9	12.8	
25	13.2	12.15	12.8	14.4	17.7	18.8	15.5	13.9	12.9	13.0	12.8	
26	13.0	12.2	12.8	14.4	18.2	18.2	15.4	13.8	13.2	13.0	12.8	
27	12.9	12.2	12.6	14.7	18.4	17.8	15.1	13.5	13.0	13.0	12.6	
28	13.0	12.3	12.6	15.0	18.7	17.4	15.0	13.4	13.2	13.0	12.6	
29	13.1		12.6	15.4	18.9	17.0	14.8	13.1	13.2	13.2	12.7	
30	13.2		12.6	15.5	18.4	16.8	14.6	13.0	13.8	13.0		
31	13.5		12.8		18.6		14.4	12.9		13.0		

NOTE.—Ice affected the gage heights Jan. 1 to 12 and Nov. 30 to Dec. 31.

Daily discharge, in second-feet, of Grand River at Palisades, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1,150	3,440	1,220	1,830	6,060	18,100	10,400	4,350	3,110	3,970	2,090
2	1,150	2,360	1,320	2,090	5,170	20,400	9,770	3,610	3,110	4,350	2,090
3	1,150	1,960	1,100	2,500	4,750	20,800	9,770	3,270	2,650	3,970	2,090
4	1,150	1,960	1,220	2,650	4,960	21,800	14,300	2,950	2,090	3,270	1,830
5	1,250	1,830	1,590	2,950	5,830	22,300	13,100	2,650	1,830	9,770	1,830
6	1,250	1,710	1,830	3,270	7,020	22,800	14,700	2,650	1,960	8,060	1,960
7	1,400	1,590	2,360	2,960	9,470	23,800	16,400	2,500	1,960	6,060	1,830
8	1,400	1,480	2,090	2,650	11,300	23,800	13,900	2,360	1,830	5,170	1,830
9	1,400	1,420	2,220	2,500	15,600	24,300	11,300	2,360	1,710	4,750	1,830
10	1,450	1,270	3,610	2,360	16,400	24,800	10,400	2,360	1,590	4,350	1,830
11	1,500	1,270	3,790	2,360	14,700	22,800	9,470	2,500	1,710	3,790	2,090
12	1,500	1,370	2,800	2,360	12,700	21,800	8,330	2,650	1,710	3,270	2,220
13	1,590	1,420	2,090	2,360	11,700	22,800	7,530	2,360	1,590	2,950	1,960
14	1,480	1,370	1,960	2,360	12,000	21,800	7,020	2,500	1,710	2,800	2,090
15	1,590	1,320	1,830	1,960	12,400	21,800	6,530	2,360	1,830	2,800	1,960
16	1,590	1,270	1,590	1,590	13,900	22,300	6,530	2,090	2,090	2,800	2,090
17	1,370	1,220	1,590	1,370	15,600	20,400	7,020	2,220	1,830	2,650	2,090
18	1,420	1,270	1,590	1,590	17,200	19,900	6,530	2,090	2,090	2,650	1,830
19	1,270	1,220	1,590	2,090	17,200	19,900	6,770	2,090	1,830	2,650	2,090
20	1,270	1,180	1,590	2,360	17,200	19,900	6,770	2,220	1,830	2,500	2.090
21	1,220	1,100	1,590	2,500	13,900	19,900	6,060	2,800	1,830	2,360	2,090
22	1,220	1,100	1,590	2,950	11,700	19,400	7,270	2,360	1,960	2,090	1,830
23	1,180	1,030	1,830	3,610	11,700	19,000	8,610	2,950	1,830	2,090	1,830
24	1,220	1,100	1,830	3,790	11,000	19,000	8,060	3,270	2,090	1,960	1,830
25	2,360	1,140	1,830	4,350	13,500	18,100	6,770	3,440	1,960	2,090	1,830
26	2,090	1,180	1,830	4,350	15,600	18,100	6,530	3,270	2,360	2,090	1,830
27	1,960	1,180	1,590	4,960	16,400	13,900	5,830	2,800	2,090	2,090	1,590
28	2,090	1,270	1,590	5,610	17,700	12,400	5,610	2,650	2,360	2,090	1,590
29	2,220	....	1,590	6,530	18,600	11,000	5,170	2,220	2,360	2,360	1,710
30	2,360	....	1,590	6,770	16,400	10,400	4,750	2,090	3,270	2,090	1,700
31	2,800	....	1,830	....	17,200	....	4,350	1,960	....	2,090	....

NOTE.—Daily discharge throughout the open season determined from a rating curve well defined between 1,200 and 24,000 second-feet. Discharge Jan. 1 to 12 and on Nov. 30 estimated on account of ice.

Monthly discharge of Grand River near Palisades, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	2,800	1,150	1,550	95,300	C.
February	3,440	1,030	1,470	81,600	A.
March	3,790	1,100	1,860	114,000	A.
April	6,770	1,370	3,050	181,000	A.
May	18,600	4,750	12,700	781,000	A.
June	24,800	10,400	19,900	1,180,000	A.
July	16,400	4,350	8,570	527,000	A.
August	4,350	1,960	2,640	162,000	A.
September	3,270	1,590	2,070	123,000	A.
October	9,770	1,960	3,420	210,000	A.
November	2,220	1,590	1,920	114,000	A.
December	....	....	1,350	83,000	D.
The period	24,800	....	5,060	3,650,000	

NOTE.—Mean discharge for December estimated by comparison with dicharge at Kremmling and Glenwood Springs.

GRAND RIVER NEAR FRUITA, COLO.

Location.—At highway bridge 1½ miles south of Fruita in sec. 20, T. 1 N., R. 2 W. Ute principal meridian. Nearest important tributary, Little Salt Wash, enters a mile below the station, Gunnison River enters at Grand Junction, about 12 miles above.

Records available.— May 4, 1911, to November 30, 1911.

Drainage area.—16,800 square miles (measured from Hayden's atlas).

Gage.—Chain gage; datum was raised 0.05 foot May 3, 1911.

Channel.—Apparently permanent, although the data are not sufficient to confirm this definitely.

Discharge measurements.—Made from the highway bridge.

Winter flow.—The river is frozen over during a portion of the year and readings are taken to water surface through a hole in the ice.

Diversions.—Between the Palisades station and Fruita nearly 500 second-feet are diverted during the irrigation season.

Maximum stage.—Since the establishment of the station the maximum stage has been 15.0 feet, which occurred June 9, 1909. The highest stage known was about 18.5 feet on July 4, 1884.

Accuracy.—This station is not completely rated as yet, and estimates of discharge are not available. The base data should be reliable.

Cooperation.—The gage heights are furnished through the courtesy of the United States Weather Bureau.

Discharge measurements of Grand River near Fruita, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 17	E. O. Christiansen	3.67	3,730
May 4	J. B. Stewart	7.52	14,100
June 12	W. B. Freeman	10.63	32,000
Sept. 24	G. H. Russell	3.24	3,390

Daily gage height, in feet, of Grand River near Fruita, Colo., for 1911.

[P. W. Bryant, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1				10.0	7.7	5.2	3.0	5.9	3.9
2				10.1	7.6	5.0	3.0	5.9	3.8
3				10.2	8.2	4.8	2.9	5.8	3.7
4			7.5	10.4	8.9	4.6	3.2	5.7	3.6
5				10.6	9.1	4.4	3.2	5.8	3.5
6			8.2	10.9	8.9	4.2	3.2	6.7	3.4
7			8.7	11.2	9.4	4.0	3.1	7.4	3.3
8			9.4	11.2	8.9	3.8	3.1	6.8	3.2
9			9.6	11.3	8.4	3.6	3.1	6.6	3.1
10			10.5	11.6	7.8	3.5	2.9	6.0	3.0
11			10.3	11.2	7.4	3.4	2.8	5.5	3.0
12			9.4	10.6	7.0	3.6	2.8	5.2	3.0
13			8.9	10.5	6.9	4.0	2.8	5.0	3.0
14			9.0	10.7	6.7	4.0	2.8	4.8	3.1
15			9.0	10.6	7.1	3.8	2.8	4.8	3.2
16			9.4	10.6	7.0	3.6	3.0	4.7	3.3
17	3.7		9.6	10.4	6.9	3.4	3.2	4.6	3.4
18			9.6	10.2	6.6	3.2	3.2	4.5	3.5
19			9.8	10.3	6.6	3.2	3.1	4.4	3.4
20			9.9	10.1	6.8	3.2	2.8	4.3	3.4
21			9.4	10.3	6.8	3.0	2.7	4.2	3.4
22			9.8	10.4	6.6	3.3	2.7	4.1	3.4
23			8.5	10.2	7.4	4.0	2.8	4.1	3.3
24			8.7	9.9	7.7	4.3	3.1	4.1	3.2
25			9.0	9.4	7.0	4.4	3.2	4.0	3.1
26			9.5	9.0	3.8	4.2	3.4	4.0	3.0
27			9.8	8.5	6.5	4.0	3.6	4.0	2.9
28			9.6	8.2	6.4	3.8	4.2	4.1	
29			9.6	8.1	6.2	3.6	4.8	4.2	
30			9.6	7.9	5.8	3.4	5.6	4.1	
31			9.8		5.6	3.1		4.0	

NORTH INLET TO GRAND LAKE AT GRAND LAKE, COLO.

Location.—Just above Grand Lake in sec. 5, T. 3 N., R. 75 W., in Grand County. No tributary between the station and Grand Lake.

Records available.—August 3, 1905, to September 30, 1909; September 20, 1910, to November 20, 1911.

Drainage area.—30 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made from footbridge at the station during high water, and by wading at ordinary stages.

Diversions and storage.—There are court decrees for the diversion of 13 second-feet above the station, and reservoir decrees for the storage of 1,450 acre-feet of flood water.

Accuracy.—Conditions are favorable for accurate results and the estimates are considered reliable.

Cooperation.—During 1911 the station was maintained in cooperation with the United States Forest Service and the State engineer.

Discharge measurements of North Inlet to Grand Lake at Grand Lake, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 20[a]	R. H. Fletcher	3.00	6.2	July 30	C. L. Chatfield	2.48	68
Feb. 15[a]	.....do	3.00	6.3	Sept. 9	.....do	2.15	27
Apr. 2[b]	.....do	2.00	11.3	15	H. B. Waha	2.08	24

[a] Ice present. Gage height to top of ice. [b] Ice present. Gage height to water surface.

Daily gage height, in feet, of North Inlet to Grand Lake at Grand Lake, Colo., for 1911.

[T. O. Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1				2.60	2.42						
2				2.00	2.28		3.50				
3				2.05	2.30	3.50					2.13
4					2.30		3.30	2.35	2.25	2.23	
5					2.41	3.70		2.30			
6				2.10	2.65		3.20				
7				2.15	2.98	3.90		2.30			2.20
8				2.15	3.02		2.90				
9				2.05	3.16	4.00	2.88	2.29	2.15		
10					3.15						2.28
11				2.02	2.80	3.90	2.85				
12					2.80						
13				2.04	2.92	3.85	2.78		2.10	2.10	
14					3.20			2.25			
15		3.00		2.10	3.25	4.30	2.70		2.08		
16				2.10	3.25				2.10		2.40
17				2.06		4.20	2.70				
18				2.06	3.35					2.10	
19				2.08		3.90	2.68		2.00		
20	3.00			2.07	3.00			2.22			2.30
21				2.08	2.90	3.70	2.70				
22				2.18						2.30	
23				2.23	2.74	3.60	2.70	2.70	2.00		
24				2.28							
25				2.29	3.00	3.40	2.65			2.20	
26				2.25		3.20	2.60				
27				2.38	3.20				2.00		
28				2.48		3.10	2.50			2.00	
29				2.49	3.15		2.48		2.00		
30				2.46		3.00	2.48				
31							2.45	2.16			

NOTE.—Gage heights Jan. 1 to Apr. 22, Oct. 22 and 25, and Nov. 7 to Dec. 31, affected by ice. Gage heights Jan. 20 and Feb. 15 read to top of ice; ice on these dates was about 1.5 feet thick; average thickness of ice throughout the month of March was about 1 foot; Apr. 2 ice was 2 feet thick; ice went out of the lake May 8.

Daily discharge, in second-feet, of North Inlet to Grand Lake at Grand Lake, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		58	340	300	58	30	23
2		38	370	400	55	32	26
3		40	400	360	52	33	30
4		40	440	320	48	35	33
5		56	490	300	40	33	32
6		102	540	280	40	32	31
7		198	580	220	40	30	30
8		212	600	170	40	29	29
9		264	625	164	39	27	28
10		260	600	160	39	27	27
11		140	580	155	38	26	26
12		140	570	145	37	25	25
13		177	558	135	36	24	24
14		280	670	125	35	23	24
15		300	775	115	35	23	24
16		300	750	115	34	24	24
17		300	725	115	33	23	24
18		340	650	110	33	21	24
19		270	580	110	32	19	
20		205	535	115	32	19	
21		170	490	115	60	19	
22		150	470	115	90	19	
23	33	125	445	115	115	19	
24	38	155	400	110	105	19	
25	39	205	360	102	95	19	
26	35	240	280	90	85	19	
27	52	280	260	80	75	19	
28	67	270	240	70	65	19	
29	69	260	220	67	55	19	
30	64	292	205	67	45	20	
31		320		62	28		

NOTE.—Daily discharge determined from a fairly well defined rating curve. Mean discharge Apr. 1-22 estimated 15 second-feet. Mean discharge Oct. 19-31 estimated 20 second-feet. Mean discharge Jan. 1-Mar. 31 estimated at 6 second-feet by means of two discharge measurements and the flow at the outlet. Discharge interpolated for days when gage was not read.

Monthly discharge of North Inlet to Grand Lake at Grand Lake, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a]6.0	369	D.
February			[a]6.0	333	D.
March			[a]6.0	369	D.
April	69		24.2	1,440	D.
May	340	38	200	12,300	B.
June	775	205	492	29,300	B.
July	400	62	158	9,720	B.
August	115	28	52.1	3,200	B.
September	35	19	24.2	1,440	B.
October	33		24.0	1,480	C.
The period				60,000	

[a] Estimated.

GRAND LAKE OUTLET AT GRAND LAKE, COLO.

Location.—At the footbridge at the outlet of Grand Lake in sec. 6, T. 3 N., R. 75 W. half a mile south of Grand Lake post office. No tributary between Grand Lake and the North Fork of Grand River.

Records available.—July 3, 1904, to September 30, 1909; September 20, 1910, to December 31, 1911.

Drainage area.—62 square miles (measured from Hayden's Atlas).

Gage.—Vertical staff; location and datum unchanged. Being so close to the outlet the gage heights represent the level of the water surface in Grand Lake.

Channel.—Somewhat rough but permanent.

Discharge measurements.—Made by wading at various points below the gage.

Winter flow.—Shore ice forms at the station for about four months, but the stream does not freeze over because of the higher temperature of the water coming out of Grand Lake.

Diversions.—No water is diverted below the station on the North Inlet. There are court decrees for diversion above that point.

Artificial control.—As the area of Grand Lake is only 700 acres, or a little more than 1 square mile, its effect as a natural reservoir on the run-off is not great.

Accuracy.—Owing to the scarcity of gage heights the records at this station can not be considered excellent, but on account of the natural regulation of Grand Lake, the flow is uniform. This uniformity of flow and permanence of channel indicate that the estimates are good.

Cooperation.—Since its reestablishment in 1910 the station has been maintained in cooperation with the United States Forest Service and the State engineer.

Discharge measurements of Grand Lake Outlet at Grand Lake, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 20[a]	R. H. Fletcher	1.52	12.4	July 31	C. L. Chatfield	2.15	103
Feb. 15[a]	do	1.52	12.3	Sept. 9	do	1.80	40.0
Apr. 2	do	1.50	12.8	16	H. B. Waha	1.72	38.1

[a] Ice conditions.

Daily gage height, in feet, of Grand Lake Outlet at Grand Lake, Colo., for 1911.

[T. O. Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1					2.1							
2			1.4	1.5	2.08		3.4					
3					2.02	3.6					1.6	
4					2.07		3.20	2.05		2.1	1.6	
5					2.12	3.7		2.0				1.45
6					2.28		3.0				1.6	
7					2.48	3.8		1.98				
8					2.75		2.85					
9			1.5	1.58	2.9	3.9			1.85		1.6	
10				1.58	3.0		2.8					
11					2.8	3.8						
12				1.58	2.7		2.7					
13					2.8	3.7			1.75	1.9		
14				1.6	2.7		2.7	1.95				
15		1.52		1.6	2.95	4.0						1.40
16				1.58	3.0		2.65		1.72		1.58	
17				1.58		3.7						
18			1.5	1.59	3.2		2.6			1.85		
19				1.61		3.6			1.68			
20	1.52			1.62	2.8		2.55	1.9			1.5	
21				1.75	2.8	3.5						
22				1.72			2.5			1.75		
23		1.4		1.8	2.5	3.4		2.2	1.63			
24				1.82			2.5					
25			1.45	1.88	2.85	3.2				1.7	1.52	
26				1.9			2.4					
27				1.96	3.0	3.2			1.6		1.5	
28				2.02			2.3			1.7		
29				2.07	3.0	3.0			1.6			
30				2.15		2.95					1.5	
31			1.5				2.3	1.86				

NOTE.—Gage heights affected by ice Jan. 1 to Mar. 18 and Nov. 16 to Dec. 31.

Daily discharge, in second-feet, of Grand Lake Outlet at Grand Lake, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			12	15	95	538	450	130	53	53	27	12
2			12	15	91	594	550	115	53	67	26	12
3			12	16	79	650	500	100	53	81	25	12
4			12	17	89	675	450	85	53	95	25	12
5			12	18	99	700	410	75	53	92	25	12
6			12	20	135	725	370	74	53	88	25	12
7			12	21	194	750	330	72	53	84	25	12
8			12	22	275	780	310	72	53	80	25	12
9			12	23	330	810	300	71	53	76	25	12
10			12	23	370	780	290	71	49	72	24	12
11			11	23	290	750	275	69	46	68	23	12
12			11	23	260	725	260	69	43	64	22	12
13			11	24	290	700	260	68	40	60	21	12
14			11	25	260	785	260	68	39	59	20	12
15		12	11	25	350	870	252	67	38	57	19	12
16			11	23	370	785	245	66	37	56	18	12
17			11	23	410	700	238	64	36	54	17	12
18			11	24	450	675	230	63	34	53	16	12
19			11	26	370	650	222	62	33	50	15	12
20	12		11	27	290	625	215	60	32	46	15	12
21			10	40	290	600	208	78	31	43	15	12
22			10	37	245	575	200	96	29	40	15	12
23			10	45	200	550	200	115	28	38	15	12
24			10	48	255	500	200	108	28	36	15	12
25			10	57	310	450	185	101	27	35	15	12
26			10	60	340	450	170	93	26	35	15	12
27			11	69	370	450	155	85	25	35	15	12
28			12	79	370	410	140	77	25	35	15	12
29			13	89	370	370	140	69	25	33	15	12
30			14	105	426	350	140	61	39	31	15	12
31			15		482		140	53		29		12

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Mar. 1 to 25 and Nov. 16 to Dec. 31 estimated. Discharge interpolated for other days for which gage heights are missing.

Monthly discharge of Grand Lake Outlet at Grand Lake, Colo., for 1911.

[Drainage area, 62 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a] 12.0	0.193	0.22	738	C.
February			[a] 12.0	.193	.20	666	C.
March	15	10	11.5	.185	.21	707	B.
April	105	15	35.4	.571	.64	2,110	A.
May	482	79	282	4.55	5.25	17,300	A.
June	870	350	632	10.19	11.37	37,600	B.
July	550	140	268	4.32	4.98	16,500	A.
August	130	53	79.3	1.28	1.48	4,880	B.
September	53	25	39.6	.639	.71	2,360	B.
October	95	29	56.3	.908	1.05	3,460	B.
November	27	15	19.6	.316	.35	1,170	B.
December			12.0	.194	.22	738	C.
The year	870	10	122	1.96	26.68	88,200	

[a] Estimated from 2 discharge measurements and uniform flow of the river.

FRASER RIVER BASIN.

FRASER RIVER NEAR FRASER, COLO.

Location.—Two miles south of Spruce Lodge ranger station, in the Arapahoe National Forest, 10 miles from Fraser post office. Current Creek enters 2 miles above the station, and Jim Creek 3 miles below.

Records available.—May 1, 1908, to September 17, 1911.

Drainage area.—Approximately 9 square miles.

Gage.—An automatic recording gage installed June 29, 1911. A staff gage was used during 1908. July 7, 1909, a second staff gage was installed at a different datum which has remained unchanged. The recording gage reads to the same datum as the second staff gage.

Channel.—Somewhat shifting.

Discharge measurements.—Made from a footbridge.

Winter flow.—No data.

Diversions.—There is a court decree for the diversion of 53 second-feet from Fraser River above the station into Clear Creek on the eastern slope. There is also a provisional decree for a similar diversion of 700 second-feet, which has not yet been made.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained and records furnished through the courtesy of the Denver Reservoir Irrigation Co.

The following discharge measurement was made by Stanley Krajicek:

June 30, 1911: Gage height, 0.91 foot; discharge, 30.8 second-feet.

Daily gage height, in feet, of Fraser River near Fraser, Colo., for 1911.

[Mrs. H. J. Mills, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		0.20	0.20	0.20			0.95	0.80	0.72
2		.20	.20	.20	0.40		1.10	.80	.72
3		.20	.20	.20			1.16	.80	.72
4		.20	.20	.20			1.22	.80	.72
5		.20	.20	.20			1.46	.80	.72
6		.20	.20	.20	.70		1.47	.80	.72
7		.20	.20	.20			1.42	.79	.72
8		.20	.20	.20			1.32	.77	.71
9		.20	.20	.20	1.00		1.28	.75	.70
10		.20	.20	.20			1.54	.76	.69
11		.20	.20	.20			1.32	.75	.66
12		.20	.20	.20			1.02	.73	.66
13		.20	.20	.20	1.00		1.05	.73	.67
14		.20	.20	.20			1.00	.72	.68
15		.20	.20	.20			.98	.72	.68
16	0.20	.20	.20	.20			.97	.72	.65
17	.20	.20	.20	.20			.96	.72	.65
18	.20	.20	.20	.20			.96	.73	
19	.20	.20	.20	.20			.94	.72	
20	.20	.20	.20	.20			.91	.74	
21	.20	.20	.20	.20			.91	.73	
22	.20	.20	.20	.25			.89	.72	
23	.20	.20	.20				.89	.75	
24	.20	.20	.20				.87	.74	
25	.20	.20	.20	.30			.85	.72	
26	.20	.20	.20				.85	.73	
27	.20	.20	.20				.85	.72	
28	.20	.20	.20				.85	.72	
29	.20		.20	.30		0.95	.82	.71	
30	.20		.20			.93	.80	.71	
31	.20		.20				.80	.71	

FRASER RIVER NEAR ARROW, COLO.

Location.—One-fourth mile from Idlewild ranger station, in the Arapahoe National Forest, in sec. 3, T. 2 S., R. 75 W., sixth principal meridian, 2 miles from Arrow.

Records available.—September 23, 1910, to December 31, 1911.

Drainage area.—16 square miles (measured from Forest atlas).

Gage.—Vertical staff whose location and datum have remained unchanged.

Channel.—Shifting after high water.

Discharge measurements.—Made from log bridge to which the gage is attached.

Winter flow.—Ice causes backwater during the winter months, and discharge measurements are made to determine the winter flow.

Diversions.—There are no court decrees for diversions between Fraser and Arrow, but below there is a decree for diversion of 72 second-feet from Fraser River.

Accuracy.—With the exception of some uncertainty in the records derived from application of the upper part of the rating curve the records can be considered fair or possibly good.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Fraser River near Arrow, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 28	Ripple and Wills	1.36	92.5
Sept. 12	H. B. Waha	.90	30.5
Dec. 7[a]	do	.90	9.6

[a] Ice conditions.

Daily gage height, in feet, and discharge, in second-feet, of Fraser River near Arrow, Colo., for 1910.

[S. S. Linscott, observer.]

Day.	October. Gage height.	October. Discharge.	Day.	October. Gage height.	October. Discharge.	Day.	October. Gage height.	October. Discharge.
2	0.8	19	9	0.75	14	16	0.75	14
3	.75	14	10	.75	14	17	.7	8
4	.8	19	11	.75	14	18	.7	8
5	.8	19	12	.75	14	19	.7	8
6	.8	19	13	.75	14	20	.75	14
7	.75	14	14	.75	14	21	.7	8
8	.8	19	15	.75	14	22	.7	8

Daily gage height, in feet, of Fraser River near Arrow, Colo., for 1911.

[L. W. McGrew, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.95	2.05	1.35	1.10	1.00	0.85	0.90	0.90
2		.70	2.00	1.50	1.12	1.00	.85		
3	0.90	.85	2.05	1.55	1.05	1.00	.85		
4		.85	2.15	1.65	1.00	1.00	.85	.90	.90
5		.92	1.80	2.40	.95	.95	.89		
6		.90	2.30	2.10	1.05	.92	.90	2.00	
7	.90	.92	1.90	1.85	1.05		.90		.90
8		1.00	2.40	1.75	1.00		.90		
9		1.25	2.40	1.55	1.00	.90	.85	1.90	
10		1.25	2.35	1.50	1.05	.90	.88	1.20	.90

Daily gage height, in feet, of Fraser River near Arrow, Colo., for 1911—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	.90	1.35	2.30	1.45	1.00	0.92	0.85		
12		1.20	2.35	1.40	1.00	.90	.85		
13		1.15	2.20	1.40	1.00	.90	.85	1.90	
14		1.25	2.15	1.35	1.00	.90	.80		0.90
15		1.60	2.15	1.30		.90	.82		
16		1.45	2.10	1.35	1.05	.90	.82	1.10	
17	.90	1.48	2.00	1.35	1.00	.90	.82		.70
18		1.40	2.10	1.30	1.00	.90	.85		
19	.90	1.35	2.00	1.30		.90			
20		1.35	1.90	1.30	1.10	.92		.80	
21		1.30	2.00	1.25	1.00	.90			
22		1.30	1.85	1.25		.85	1.95		
23	.80	1.20	1.70	1.30			2.10		.70
24		1.40	1.75	1.25	1.00	.88	1.10		
25	.75	1.60	1.55	1.20	1.00	.85		1.10	
26	.85	1.55	1.40	1.15	1.00	.85	.90		.70
27	.80	1.60		1.15	1.00	.85			
28	.90	1.65	1.50	1.18	1.00	.85	.80	1.00	
29	.90	1.80	1.45	1.10	1.00	.89			
30		1.90	1.45	1.10	1.00	.91	2.00		.70
31		2.10		1.10			1.00		

NOTE.—Gage readings Oct. 22 to Dec. 31 affected by ice.

Daily discharge, in second-feet, of Fraser River near Arrow, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	31	38	185	90	57	44	25
2	31	8	178	111	60	44	25
3	31	25	185	118	50	44	25
4	31	25	199	131	44	44	25
5	31	34	151	234	38	38	30
6	31	31	220	192	50	34	31
7	31	34	165	158	50	33	31
8	31	44	234	144	44	32	31
9	31	77	234	118	44	31	25
10	31	77	227	111	50	31	29
11	31	90	220	104	44	34	25
12	31	70	227	97	44	31	25
13	31	64	206	97	44	31	25
14	31	77	199	90	44	31	19
15	31	124	199	84	47	31	21
16	31	104	192	90	50	31	21
17	31	108	178	90	44	31	21
18	31	97	192	84	44	31	25
19	31	90	178	84	50	31	24
20	28	90	165	84	57	34	23
21	25	84	178	77	44	31	22
22	22	84	158	77	44	25	22
23	19	70	138	84	44	27	22
24	16	97	144	77	44	29	22
25	14	124	118	70	44	25	22
26	25	118	97	64	44	25	20
27	19	124	104	64	44	25	20
28	31	131	111	67	44	25	20
29	31	151	104	57	44	30	20
30	34	165	104	57	44	32	20
31		192		57	44		20

NOTE.—Daily discharge determined from a rating curve fairly well defined below 160 second-feet. Above that stage the curve is somewhat uncertain. Discharge estimated Oct. 22 to 31. Discharge interpolated on other days for which gage heights are missing.

Monthly discharge of Fraser River near Arrow, Colo., for 1910–11.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1910.					
October 2–22	19	8	13.8	574	B.
1911.					
April	34	14	28.4	1,690	C.
May	192	8	85.4	5,250	B.
June	234	97	173	10,300	C.
July	234	57	98.8	6,080	B.
August	60	38	46.4	2,850	B.
September	44	25	32.2	1,920	B.
October	31	19	23.7	1,460	C.
November			[a] 15.0	893	D.
December			[a] 9.0	553	C.
The period				31,000	

[a] Estimated from discharge measurements.

WILLIAMS FORK BASIN.

WILLIAMS FORK NEAR SCHOLL, COLO.

Location.—About 5 miles southeast of Scholl, Colo., in sec. 3, T. 2 S., R. 78 W., at the Horseshoe ranger station in the Arapahoe National Forest. Nearest important tributary, the South Fork, enters from the east 1 mile below the station.

Records available.—September 22, 1910, to December 31, 1911.

Drainage area.—141 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading a short distance below the gage.

Winter flow.—As no winter measurements have been made, it is not known if ice causes backwater.

Diversions.—There are court decrees for the diversion of 858 second-feet from Williams Fork above the station. Of this amount 700 second-feet are to be diverted to the eastern slope. This latter diversion has not yet been made.

Accuracy.—As the station has not been completely rated, estimates of discharge can not be made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. B. Waha:

September 14, 1911: Gage height, 1.50 feet; discharge, 91.2 second-feet.

Daily gage height, in feet, of Williams Fork near Scholl, Colo., for 1911.

[W. M. Thomas, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		1.15	1.1	1.15	1.75	3.0	2.35	1.8	1.6	1.5	1.45	1.1
2		1.15	1.1	1.15	1.6	3.05	2.65	1.8	1.6	1.45	1.4	1.1
3		1.15	1.1	1.25	1.65	3.1	2.55	1.7	1.6	1.4	1.4	1.1
4		1.2	1.15	1.25	1.75	3.05	2.5	1.7	1.6	1.4	1.35	1.1
5		1.2	1.15	1.25	1.85	3.1	3.05	1.7	1.6	1.55	1.4	1.1
6		1.15	1.15	1.25	2.15	3.15	2.7	1.7	1.6	1.7	1.35	1.1
7		1.15	1.15	1.25	2.3	3.15	2.5	1.7	1.6	1.65	1.4	1.1
8		1.15	1.2	1.2	2.3	3.15	2.55	1.7	1.6	1.55	1.35	1.1
9		1.15	1.15		2.35	3.1	2.45	1.7	1.5	1.5	1.4	1.1
10		1.15	1.15		2.4	3.05	2.35	1.8	1.5	1.5	1.45	1.1

Daily gage height, in feet, of Williams Fork near Scholl, Colo., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	....	1.15	1.15	....	2.25	2.95	2.3	1.8	1.5	1.5	1.3	1.1
12	....	1.15	1.15	....	2.15	3.05	2.3	1.7	1.5	1.5	1.25	1.1
13	....	1.2	1.15	....	2.15	3.2	2.3	1.7	1.5	1.5	1.3	1.1
14	....	1.15	1.15	....	2.2	3.1	2.25	1.7	1.5	1.4	1.3	1.1
15	1.2	1.15	1.15	....	2.5	3.05	2.2	1.7	1.55	1.5	1.4	1.1
16	1.1	1.1	1.15	....	2.45	3.1	2.2	1.7	1.5	1.6	1.35	1.1
17	1.15	1.15	1.15	....	2.45	3.15	2.2	1.6	1.5	1.55	1.35	1.1
18	1.2	1.15	1.15	....	2.55	2.9	2.2	1.6	1.5	1.5	1.35	1.1
19	1.2	1.1	1.15	....	2.6	2.9	2.1	1.6	1.4	1.5	1.35	1.1
20	1.2	1.1	1.2	....	2.4	2.95	2.1	1.7	1.4	1.45	1.35	1.2
21	1.2	1.1	1.2	....	2.35	2.85	2.15	1.7	1.4	1.4	1.25	1.2
22	1.2	1.1	1.15	....	2.35	2.85	2.1	1.75	1.4	1.45	1.25	1.2
23	1.2	1.1	1.15	1.65	2.35	2.8	2.1	1.8	1.4	1.4	1.25	1.2
24	1.2	1.1	1.2	1.6	2.45	2.7	2.1	1.75	1.4	1.6	1.25	1.2
25	1.2	1.1	1.15	1.6	2.45	2.7	2.0	1.7	1.4	1.45	1.2	1.2
26	1.2	1.1	1.15	1.65	2.45	2.6	2.0	1.7	1.4	1.5	1.25	1.1
27	1.2	1.1	1.3	1.7	2.55	2.6	2.0	1.7	1.4	1.6	1.2	1.1
28	1.2	1.1	1.2	1.7	2.55	2.5	1.9	1.7	1.4	1.6	1.2	1.1
29	1.25	....	1.15	1.75	2.7	2.5	1.9	1.65	1.45	1.45	1.15	1.1
30	1.15	....	1.15	1.85	2.8	2.4	1.9	1.6	1.55	1.45	1.1	1.1
31	1.15	....	1.2	....	2.8	....	1.9	1.6	....	1.45	....	1.1

NOTE.—Ice present Jan. 15 to Apr. 8 and Nov. 29 to Dec. 31.

WILLIAMS FORK NEAR SULPHUR SPRINGS, COLO.

Location.—On highway bridge at Field's ranch, 4 miles above the mouth of the river, about sec. 36, T. 1 N., R. 79 W. Nearest tributary is a small stream that enters from the west 2 miles below the station.

Records available.—July 25, 1904, to December 31, 1911.

Drainage area.—185 square miles (measured from Forest atlas).

Gage.—Vertical staff; location and datum unchanged.

Channel.—Shifting after high water.

Discharge measurements.—Made from bridge to which the gage is attached.

Winter flow.—The main channel is kept open by springs, but ice forms along the edges and slush ice frequently forms. The morning readings are usually affected by backwater from ice, but the afternoon readings are practically unaffected. The winter gage heights during 1911 were taken in the afternoon.

Diversions.—There are court decrees for the diversion of 502 second-feet from Williams Fork between this station and the one near Scholl, and 25 second-feet from tributaries. There is also a storage decree for 80,700 acre-feet from Williams Fork.

Accuracy.—Conditions are favorable for accurate results, and the estimates should be reliable.

Cooperation.—During 1911 station was maintained in cooperation with the State engineer.

Discharge measurements of Williams Fork near Sulphur Springs, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 18	R. H. Fletcher	2.98	41.6	July 28	C. L. Chatfield	3.60	135
Feb. 13	.....do	3.08	56.2	Sept. 4	.....do	3.38	91
Apr. 4	.....do	3.25	81.7				

Daily gage height, in feet, of Williams Fork near Sulphur Springs, Colo., for 1911.

[F. A. Field, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.02	3.05	3.00	3.10	3.48	4.42	3.96	3.04	3.30	3.34	3.26	3.15
2	3.02	3.05	3.00	3.12	3.45	4.45	4.31	3.49	3.32	3.29	3.25	3.15
3	3.03	3.02	3.02	3.15	3.41	4.44	4.30	3.49	3.32	3.26	3.02	3.20
4	3.05	3.00	3.00	3.25	3.44	4.46	4.18	3.50	3.42	3.25	3.10	3.15
5	3.06	2.98	3.02	3.20	3.51	4.45	4.42	3.44	3.31	3.35	3.08	3.20
6	3.03	2.97	3.02	3.18	3.80	4.48	4.35	3.40	3.31	3.55	3.08	3.20
7	3.02	2.92	3.02	3.12	3.86	4.48	4.26	3.38	3.30	3.54	3.05	3.25
8	3.03	2.95	3.03	3.12	3.99	4.55	4.15	3.37	3.29	3.44	3.05	3.30
9	3.04	3.00	3.10	3.12	3.98	4.55	4.08	3.38	3.26	3.37	3.08	3.20
10	3.05	3.00	3.10	3.15	4.07	4.55	3.98	3.32	3.23	3.34	3.10	3.20
11	3.08	3.02	3.08	3.12	3.88	4.50	3.95	3.45	3.22	3.30	3.10	3.18
12	3.07	3.01	3.04	3.08	3.82	4.50	3.90	3.46	3.22	3.38	3.10	3.15
13	3.05	3.08	3.02	3.00	3.82	4.50	3.87	3.40	3.25	3.30	3.30	3.12
14	3.03	3.04	3.04	2.95	3.96	4.42	3.84	3.40	3.28	3.35	3.28	3.10
15	3.00	3.02	3.08	3.12	4.02	4.40	3.82	3.38	3.38	3.29	3.30	3.10
16	3.00	3.02	3.11	3.10	4.10	4.42	3.80	3.34	3.28	3.29	3.28	3.12
17	3.02	3.03	3.04	3.08	4.10	4.35	3.88	3.34	3.24	3.28	3.25	3.12
18	2.98	3.03	3.04	3.05	4.15	4.37	3.88	3.30	3.19	3.28	3.28	3.12
19	3.00	3.00	3.08	3.10	4.25	4.30	3.86	3.32	3.20	3.30	3.26	3.12
20	3.05	2.95	3.10	3.05	4.20	4.35	3.78	3.31	3.20	3.28	3.30	3.12
21	3.05	2.95	3.12	3.32	4.15	4.37	3.75	3.46	3.20	3.30	3.30	3.10
22	3.00	3.00	3.12	3.40	4.10	4.50	3.72	3.42	3.20	3.29	3.28	3.10
23	3.02	3.02	3.10	3.45	3.88	4.35	3.85	3.67	3.19	3.29	3.25	3.08
24	3.02	3.00	3.10	3.46	3.85	4.25	3.72	3.54	3.18	3.30	3.29	3.08
25	3.03	3.03	3.08	3.39	4.02	4.18	3.68	3.48	3.19	3.28	3.00	3.08
26	3.04	2.98	3.04	3.36	4.10	4.18	3.62	3.41	3.22	3.28	3.00	3.05
27	3.03	2.98	3.20	3.51	4.10	4.12	3.64	3.38	3.21	3.28	3.10	3.08
28	2.98	3.00	3.10	3.64	4.15	4.05	3.62	3.36	3.20	3.30	3.05	3.08
29	3.04	......	3.28	3.62	4.15	4.00	3.62	3.33	3.21	3.30	3.05	3.07
30	3.08	......	3.10	3.50	4.25	3.95	3.58	3.31	3.36	3.29	3.10	3.05
31	3.10	......	3.12	......	4.30	......	3.54	3.30	......	3.20	......	3.05

NOTE.—Gage heights Dec. 1 to 31 probably slightly affected by ice.

Daily discharge, in second-feet, of Williams Fork near Sulphur Springs, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	44	51	50	62	111	556	277	125	80	86	75
2	44	51	50	64	105	580	472	113	83	79	74
3	45	48	52	68	97	572	465	113	83	75	52
4	47	47	50	81	103	588	389	115	99	74	58
5	48	45	52	74	118	580	556	103	82	88	56
6	45	48	52	71	210	604	502	95	82	128	56
7	44	45	52	64	234	604	439	92	80	125	54
8	45	47	52	64	290	665	372	90	79	108	54
9	46	50	58	64	286	665	335	92	75	90	56
10	47	50	58	68	330	665	286	83	72	86	58
11	50	52	61	64	242	620	272	105	70	80	58
12	49	51	57	61	218	620	250	107	70	92	58
13	47	56	56	54	218	620	238	95	74	80	80
14	45	53	57	51	286	556	226	95	78	88	78
15	43	52	61	64	305	540	218	92	92	79	80
16	43	52	63	62	345	556	210	86	78	79	78
17	44	52	57	61	345	502	242	86	73	78	74
18	41	52	57	58	372	518	242	80	67	78	73
19	43	50	61	62	432	465	230	83	68	80	73
20	47	47	62	58	400	502	202	82	68	78	80
21	47	47	64	92	372	518	191	107	68	80	80
22	43	50	64	105	345	620	180	99	68	79	78
23	44	52	62	115	242	502	230	162	67	79	74
24	44	50	62	117	230	432	180	125	66	80	68
25	45	52	61	104	305	389	166	111	67	78	50
26	49	49	57	98	345	389	146	97	70	78	50
27	47	49	74	118	345	356	153	92	69	78	58
28	45	50	62	153	372	320	146	89	68	80	54
29	49	....	85	146	372	295	146	84	69	80	54
30	53	....	62	115	432	272	135	82	89	79	58
31	55	....	64	....	465	....	126	80	....	68	....

NOTE.—Daily discharge determined from a rating curve fairly well defined above 3.5 feet. Discharge for quantities below 3.5 feet determined by indirect method.

Monthly discharge of Williams Fork near Sulphur Springs, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	55	41	46.1	2,830	D.
February	56	45	49.9	2,770	D.
March	85	50	59.2	3,640	D.
April	153	51	81.3	4,840	D.
May	465	97	286	17,600	B.
June	665	272	522	31,100	B.
July	472	125	265	16,300	B.
August	162	80	98.7	6,070	D.
September	99	66	75.1	4,470	D.
October	128	68	84.0	5,160	D.
November	80	50	65.3	3,890	D.
December	....	....	[a] 55	3,380	D.
The year	665	....	141	102,000	

[a] Estimated.

BLUE RIVER BASIN.

BLUE RIVER AT DILLON, COLO.

Location.—At the cemetery bridge on the outskirts of Dillon, in sec. 18, T. 5 S., R. 77 W., on the edge of the Leadville National Forest, a short distance above the mouth of Snake River. Tenmile Creek also enters below the station.

Records available.—October 15, 1910, to December 31, 1911.

Drainage area.—110 square miles (Forest Service atlas).

Gage.—Vertical staff; location and datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made by wading near by.

Winter flow.—Ice causes backwater during the winter and discharge measurements are made to determine the flow.

Diversions.—There are court decrees for diversions of 2.3 second-feet from Blue River above the station and 68 second-feet below. There are also decrees for diversions of 5 second-feet from tributaries entering above. In addition, there are decrees for placer mining, where practically all of the water used is returned to the river.

Accuracy.—Owing to the high altitude of this station there are liable to be appreciable diurnal fluctuations at certain seasons, due to alternate melting and freezing, and the mean daily gage height based on one gage reading may be considerably in error. For this reason it is probable that the estimates can not be considered better than fair or possibly good.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Blue River at Dillon, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 9[a]	G. H. Russell	1.60	18.8	Sept. 18	O. M. Wimmer	1.70	57.8
Feb. 8[a]	O. M. Wimmer	1.60	22.8	Dec. 26[a]	H. B. Waha	1.45	35.8
July 13	.....do	2.50	297				

[a] Ice conditions.

Daily gage height, in feet, of Blue River at Dillon, Colo., for 1911.

[I. W. Blundell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1					1.8	2.8		2.1	1.9		1.5	
2		1.6	1.1		1.7	2.9	2.8			1.6	1.4	2.9
3			1.0		1.9	2.6	2.8			1.6	1.4	
4				1.4	1.9	2.8		2.0		1.7	1.4	2.9
5				1.4	2.1	2.8	2.8		1.9	1.9		
6		1.15		1.4	2.45	2.8	3.6			1.9	1.5	2.8
7			1.0	1.4	2.3	2.9	2.9			1.8	1.8	2.6
8		1.6			2.5	2.9	2.8	1.9	1.9			2.7
9	1.6	1.15	1.0		2.5	2.9				1.75	1.5	2.8
10				1.35	2.65	2.8	2.8			1.75		
11			1.2		2.4		2.8			1.75	1.7	2.6
12	1.2			1.3	2.3	2.8		1.9	1.9	1.7		1.5
13		1.5	1.1	1.35	2.25	2.8	2.6			1.75		1.6
14				1.34		2.8		1.9		1.8	1.8	1.5
15		1.5	1.1		2.7	2.6	2.6					1.5
16			1.0	1.4	2.65	2.4				1.8	1.8	2.4
17					2.7	2.6				1.7	1.9	
18		1.2	1.3	1.42	2.75		2.6	1.85	1.7	1.65	2.1	1.8
19	1.5		1.4	1.35	2.75	2.8			1.9	1.6		1.6
20		1.2		1.48	2.6	2.8			1.9	1.5	2.2	
21				1.6		2.8	2.5		1.95	1.4		
22				1.55	2.5	2.8	2.5	2.2	1.95			
23		1.3	1.6		2.4	2.7			1.9	1.5	2.3	1.5
24				1.7	2.6	2.7	2.4			1.5	2.3	
25	1.6			1.65	2.8			2.1		1.5		
26			4.2	1.78	2.6	2.7	2.3		1.7			1.45
27		1.0	2.0	2.0	2.5	2.5	2.3		1.6	1.5		
28	1.5					2.5	2.3		1.0	1.5		
29			3.0	2.1	2.6	2.5		1.9				
30	1.5		3.0		2.4	2.4			1.9	1.5		1.4
31					2.8		2.2			1.4		

NOTE.—Gage heights Jan. 1 to Mar. 30 and Nov. 7 to Dec. 31 affected by ice.

Daily discharge, in second-feet, of Blue River at Dillon, Colo., for 1910–11.

[I. W. Blundell, observer.]

Day.	1910.		1911.								
	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		34	30	72	405	325	145	90	68	38	
2		30	30	58	455	405	135	90	47	30	
3		26	30	90	320	405	125	90	47	30	
4		27	30	90	405	405	115	90	58	30	
5		28	30	145	405	405	108	90	90	34	
6		29	30	262	405	840	102	90	90	38	
7		30	30	210	455	455	96	90	72		
8		30	28	280	455	405	90	90	68		
9		30	27	280	455	405	90	90	65		
10		30	26	340	405	405	90	90	65		
11		26	24	245	405	405	90	90	65		
12		23	23	210	405	362	90	90	58		
13		23	26	192	405	320	90	85	65		
14		23	26	276	405	320	90	80	72		
15	38	23	28	360	320	320	88	75	72		
16	34	23	30	340	245	320	86	70	72		
17	30	23	31	360	320	320	84	64	58		
18	30	30	32	382	362	320	81	58	52		
19	34	30	26	382	405	306	105	90	47		
20	38	30	36	320	405	393	129	90	38		
21	36	30	47	300	405	280	152	102	30		
22	34	31	42	280	405	280	175	102	34		
23	34	32	50	245	360	262	165	90	38		
24	34	34	58	320	360	245	155	80	38		
25	35	36	54	405	360	228	145	69	38		

Daily discharge, in second-feet, of Blue River at Dillon, Colo., for 1910–11—Continued.

Day.	1910.		1911.								
	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	36	38	69	320	360	210	132	58	38		36
27	37	38	115	280	280	210	118	47	38		
28	38	38	130	300	280	210	104	62	38		
29	47	38	145	320	280	198	90	76	38		
30	43	38	108	245	245	186	90	90	38		
31	38			405		175	90		30		

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Blue River at Dillon, Colo., for 1910–11.

[Drainage area, 110 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1910.							
October, 15–31	47	30	36.2	0.329	0.21	1,220	C.
November	38	23	30.0	.273	.30	1,790	C.
1911.							
January			[a] 20	.182	.21	1,230	D.
February			[a] 20	.182	.19	1,110	D.
March			[a] 20	.182	.21	1,230	D.
April	145	23	46.4	.422	.47	2,760	B.
May	405	58	268	2.44	2.81	16,500	B.
June	455	245	373	3.39	3.78	22,200	B.
July	840	175	333	3.03	3.49	20,500	B.
August	175	81	111	1.01	1.16	6,820	B.
September	102	58	82.3	.748	.83	4,900	B.
October	90	30	53.8	.489	.56	3,310	B.
November			[a] 30	.273	.30	1,790	D.
December			[a] 33	.300	.35	2,030	D.
The year	840	23	116	1.05	14.36	84,400	

[a] Estimated from measurements and climatological data.

TENMILE CREEK AT DILLON, COLO.

Location.—At the highway bridge in Dillon, Colo., in sec. 18, T. 5 S., R. 77 W., 300 yards above the mouth of the creek. Nearest tributary, Canon Creek, enters from the west about 4 miles above the station.

Records available.—October 15, 1910, to December 31, 1911.

Drainage area.—113 square miles (measured from Forest Atlas).

Gage.—Vertical staff; location and datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made by wading near the bridge.

Winter flow.—Ice causes backwater during the winter months, and discharge measurements are made to determine the flow during that period.

Diversions.—There are court decrees for diversions of 3.7 second-feet from Tenmile Creek above the station and 14.5 second-feet from tributaries entering above.

Accuracy.—As the station has not been completely rated, estimates of discharge can not be made.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Tenmile Creek at Dillon, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 9[a]	Russell and Wimmer.	1.70	15.4	July 13	O. M. Wimmer......	2.60	244
Feb. 8[a]	O. M. Wimmer......	1.70	29.2	Sept. 18	.....do............	1.90	52.5
Mar. 23[b]	.....do...............	1.52	19.8	Dec. 26[a]	H. B. Wahs.........	4.20	12.2

[a] Ice conditions. [b] Slight ice affect.

Daily gage height, in feet, of Tenmile Creek at Dillon, Colo., for 1911.

[I. W. Blundell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1					2.1	3.8		2.2	1.95		1.9	
2		1.75	1.0		2.0	4.5	3.4			1.8	1.8	2.1
3			1.0		2.2	4.2	2.4			1.8	1.8	
4				1.75	2.15	4.1		2.1		1.8	1.7	2.2
5				1.8	2.45	4.2	4.4		1.95	2.2		
6		1.6		1.75	2.95	4.0	4.0			2.1	1.6	2.2
7			1.8	1.7	3.0	4.3	3.2			2.0	2.2	2.2
8		1.7			3.6	3.9	3.0	2.0	1.9			2.2
9	1.7	1.6	1.6		3.6	4.2				1.9	1.9	2.9
10				1.7	3.75	3.6	2.9			1.9		
11			1.7		3.4		2.8			1.9	2.0	2.9
12	1.4			1.7	3.25	4.1		2.0	1.9	1.8		2.3
13		1.6	1.6	1.6	3.3	4.0	2.6			1.8		2.3
14				1.7		3.9		2.0		1.9	2.3	2.4
15		1.6	1.65		3.8	3.9	2.6					3.3
16			1.65	1.7	3.7	3.4				1.9	2.2	3.4
17					3.85	3.6				1.9	2.1	
18		1.5	1.65	1.7	4.1		2.7	2.0	1.9	1.8	2.35	
19	1.9		1.7	1.75	3.5	3.5			1.9	1.8		3.6
20		1.5		1.8	3.2	3.4			1.9	1.8	2.3	3.6
21				1.95		3.2	2.6		1.95	1.8		
22				1.9	3.0	3.1	2.6	2.4	1.95			
23		1.4	1.5		3.0	3.0			1.9	1.9	2.4	3.2
24				2.1	3.2	3.0	2.5			1.9	2.4	
25	1.8			2.0	3.9			2.4		1.8		
26			2.1	2.1	3.6	2.9	2.5		1.9			3.6
27		1.2	1.6	2.35	3.2	2.8			1.85	1.9		
28	1.8					2.8	2.4		1.8	1.9		
29			1.75	2.5	4.0	2.7		2.0				
30	1.7		1.8		3.2	2.9			2.0	1.9		3.6
31					4.2		2.3			1.8		

NOTE.—Gage heights Jan. 1 to Mar. 13 and Nov. 7 to Dec. 31 affected by ice; average thickness of ice 1.3 feet Jan. 9, 1.1 feet Feb. 8, and 2.5 feet during December.

Daily discharge, in second-feet, of Tenmile Creek at Dillon, Colo., for 1910.

Day.	Oct.	Nov.	Day.	Oct.	Nov.
1		38	16	42	33
2		33	17	42	31
3		42	18	42	29
4		42	19	38	28
5		42	20	33	27
6		42	21	36	26
7		42	22	38	27
8		42	23	38	28
9		40	24	38	30
10		38	25	39	31
11		32	26	40	33
12		26	27	41	33
13		27	28	42	33
14		29	29	53	33
15	42	31	30	48	33
			31	43	

Daily discharge, in second-feet, of Tenmile Creek at Dillon, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	40	89	810	490	115	61	55	53	....
2	....	39	69	1,160	610	105	61	42	42	....
3	....	38	115	1,010	177	97	61	42	42	....
4	....	38	102	960	640	89	61	42	33	....
5	....	42	194	1,010	1,110	85	61	115	30	....
6	....	38	398	910	910	80	58	89	26	....
7	....	33	420	1,060	510	75	55	69	....	....
8	....	33	710	860	420	69	53	61	....	....
9	....	33	710	1,010	400	69	53	58	....	....
10	....	33	785	710	375	69	53	53	....	....
11	....	33	610	835	331	69	53	58	....	....
12	....	33	535	960	290	69	53	42	....	....
13	....	26	560	910	249	69	53	42	....	....
14	....	33	685	860	249	69	53	58	....	....
15	30	33	810	860	249	69	53	53	....	....
16	30	33	760	610	260	69	53	58	....	....
17	30	33	835	710	275	69	58	53	....	....
18	30	33	960	685	289	69	58	42	....	....
19	33	38	660	660	280	95	58	42	....	....
20	30	42	510	610	265	120	58	42	....	....
21	27	61	465	510	249	150	61	42	....	....
22	24	53	420	465	249	177	61	48	....	....
23	20	71	420	420	230	177	58	53	....	....
24	40	89	510	420	212	177	58	58	....	....
25	60	69	860	400	212	177	58	42	....	....
26	89	89	710	375	212	150	53	48	....	12
27	26	160	510	331	195	120	48	58	....	....
28	32	186	710	331	177	95	42	53	....	....
29	38	212	910	289	165	69	55	58	....	....
30	42	150	510	375	155	67	69	53	....	....
31	41	....	1,010	....	144	64	....	42	....	....

NOTE.—Daily discharge, 1910–1911, computed from a well-defined rating curve. Discharge interpolated for days of missing gage heights. Mean discharge Nov. 7–30, 1911, estimated as 20 second-feet. On basis of one measurement discharge for Dec., 1911, estimated as 15 second-feet.

Monthly discharge of Tenmile Creek at Dillon, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 15–31	89	20	36.6	1,230	C.
April	212	26	61.5	3,660	B.
May	1,010	69	566	34,800	B.
June	1,160	289	704	41,900	B.
July	1,110	144	341	21,000	B.
August	177	69	98.2	6,040	B.
September	69	42	55.2	3,280	B.
October	115	42	52.8	3,250	B.
November	53	....	23.5	1,400	C.
December	....	....	[a]15	922	D.
The period	....	....	....	117,000	

[a] Estimated.

SNAKE RIVER AT DILLON, COLO.

Location.—At a highway bridge 200 yards above the mouth of the river in sec. 18, T. 5 S., R. 77 W. Nearest tributary is a small stream that enters from the north 1 mile above the station.

Records available.—October 15, 1910, to December 31, 1911.

Drainage area.—92 square miles (Forest Service Atlas.)

Gage.—Vertical staff; location and datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made by wading above the bridge.

Winter flow.—Ice gorges cause backwater of varying amount. Discharge measurements are made to determine the flow.

Diversions.—There are court decrees for diversions of 4.5 second-feet from Snake River above the station, and 11 second-feet from tributaries entering above.

Accuracy.—Owing to the high altitude of this station there are liable to be appreciable diurnal fluctuations at certain seasons, due to alternate melting and freezing, and the mean daily gage height based on one gage reading may be considerably in error. For this reason it is probable that the estimates can not be considered better than fair or possibly good.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Snake River at Dillon, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 9[a]	Russell and Wimmer	0.60	8.0	July 13	O. M. Wimmer	1.90	223
Feb. 8[a]	O. M. Wimmer	1.32	14.4	Sept. 18	do	.90	26.4
Mar. 23	do	.69	13.5	Dec. 26[a]	H. B. Waha	1.00	23.4

[a] Ice conditions.

Daily gage height, in feet, of Snake River at Dillon, Colo., for 1911.

[I. W. Blundell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	......	......	......	0.9	2.3	......	1.4	1.15	......	0.9	......
2	......	0.8	0.6	......	.8	2.5	......	......	......	0.8	.8	2.2
3	......	......	.6	......	1.0	2.2	......	......	......	.8	.8	......
4	......	......	......	0.7	1.0	2.5	......	1.3	......	.8	.7	2.3
5	......	......	......	.7	1.05	2.5	......	......	1.1	1.0	......	......
6	......	1.15	......	.8	1.45	2.6	......	......	......	1.0	.8	2.5
7	......	......	.6	.7	1.3	2.5	......	......	......	1.0	1.0	2.15
8	......	1.3	......	......	1.6	2.4	......	1.2	1.0	......	......	2.5
9	0.6	1.3	.6	......	1.6	2.5	......	......	......	.9	.8	2.5
10	......	......	......	.7	1.55	2.1	......	......	......	.9	......	......
11	......	......	.65	......	2.5	......	......	......	......	.9	.9	1.9
12	.6	......	......	.63	1.45	2.6	......	1.2	1.0	.8	......	1.9
13	......	.6	.6	.6	1.35	2.6	1.9	......	......	.9	......	1.8
14	......	......	......	.65	......	2.6	......	1.1	......	.9	1.1	1.7
15	......	.62	.6	......	1.8	2.4	1.9	......	......	......	......	1.8
16	......	......	.65	.7	1.75	2.6	......	......	......	.9	.9	1.8
17	......	......	......	......	1.85	2.2	......	......	......	.9	1.0	......
18	......	.6	.65	.64	2.0	......	1.9	1.1	.9	.8	1.1	......
19	1.5	......	.7	.65	1.85	2.4	......	......	.95	.8	......	1.0
20	......	.6	......	.7	1.7	2.5	......	......	.95	.9	1.1	.9
21	......	......	......	.85	......	2.6	1.8	......	1.0	1.0	......	......
22	......	......	......	.8	1.6	2.6	1.7	1.5	1.0	......	......	......
23	......	1.0	1.0	......	1.5	2.5	......	......	1.0	1.0	1.4	.9
24	......	......	......	.9	1.7	2.5	1.6	......	......	1.0	1.8	......
25	1.1	......	......	.88	1.8	......	......	1.4	......	1.0	......	......
26	......	......	1.0	.99	2.0	2.4	1.5	......	.95	......	......	1.0
27	......	1.0	1.0	1.2	1.8	1.9	1.5	......	.9	1.0	......	......
28	.8	......	......	......	......	2.0	1.5	......	.85	1.0	......	......
29	......	......	1.0	1.1	2.3	2.0	......	1.2	......	......	......	......
30	.8	......	.8	......	2.0	1.9	......	......	1.0	1.0	......	.9
31	......	......	......	......	2.4	......	1.4	......	......	.9	......	......

NOTE.—Gage heights Jan. 1 to Feb. 27 and Nov. 7 to Dec. 31 affected by ice; average thickness of ice in December, 1.5 feet. Gage washed out July 1 and replaced July 13.

Daily discharge, in second-feet, of Snake River at Dillon, Colo., for 1910–11.

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1910.								
1		17	11		9	21	8	5
2		17	12		7	22	9	5
3		17	13		8	23	9	6
4		17	14		9	24	9	6
5		17	15	11	10	25	9	7
6		17	16	9	11	26	10	7
7		17	17	7	7	27	11	7
8		7	18	7	11	28	11	7
9		9	19	7	9	29	17	7
10		11	20	7	7	30	17	7
						31	17	

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1			7	15	25	330	214	95	54	26	25	
2		17	7	14	17	390	214	89	52	17	17	
3			7	12	35	300	214	83	50	17	17	
4			7	11	35	390	214	77	48	17	11	
5			7	11	41	390	214	73	47	35	14	
6			7	17	105	425	214	69	43	35	17	
7			7	11	77	390	214	65	39	35		
8		14	7	11	137	360	214	61	35	30		
9	8		7	11	137	390	214	61	35	25		
10			8	11	126	270	214	61	35	25		
11			9	10	390	344	214	61	35	25		
12			8	8	105	425	214	61	35	17		
13			7	7	86	425	214	54	34	25		
14			7	9	136	425	214	47	32	25		
15			7	10	187	360	214	47	30	25		
16			9	11	174	425	214	47	28	25		
17			9	10	200	300	214	47	26	25		
18			9	9	241	330	214	47	25	17		
19			11	9	200	360	205	64	30	17		
20			17	11	161	390	196	81	30	25		
21			23	21	149	425	187	98	35	35		
22			29	17	137	425	161	115	35	35		
23			35	21	115	390	149	108	35	35		
24			35	25	161	390	137	102	34	35		
25			35	23	187	375	126	95	32	35		
26			35	34	241	360	115	88	30	35		33
27			35	61	187	214	115	79	25	35		
28	17		35	54	258	241	115	70	21	35		
29			35	47	330	241	108	61	28	35		
30	17		17	36	241	214	102	58	35	35		
31			16		360		95	56		25		

NOTE.—Daily discharge interpolated for days for which gage heights are missing. Discharge determined from a fairly well-defined rating curve.

Monthly discharge of Snake River at Dillon, Colo., for 1910–11.

[Drainage area, 92 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1910.							
October 15–31	17	7	10.3	0.112	0.07	347	B.
November	17	5	9.93	.108	.12	591	B.
December			[a] 8.0	.087	.10	492	C.
1911.							
January			[b] 12	.130	.15	738	D.
February			[b] 10	.109	.11	555	D.
March	35	7	15.9	.173	.20	978	B.
April	61	7	18.6	.202	.23	1,110	B.
May	390	17	161	1.75	2.02	9,900	C.
June	425	214	356	3.87	4.32	21,200	C.
July	214	95	183	1.99	2.29	11,300	C.
August	115	47	71.6	.778	.90	4,400	B.
September	54	21	35.1	.381	.43	2,090	B.
October	35	17	27.8	.302	.35	1,710	B.
November			[b] 20	.217	.24	1,190	D.
December			[b] 25	.272	.31	1,540	D.
The year	425		78.0	.848	11.55	56,700	

[a] Estimated.

[b] Estimated from discharge measurements and climatologic data.

EAGLE RIVER BASIN.

EAGLE RIVER AT RED CLIFF, COLO.

Location.—In sec. 30, T. 6 S., R. 80 W., in the town of Red Cliff, in the Holy Cross National Forest, 100 yards above mouth of Turkey Creek, and 1 mile above the mouth of Homestake Creek.

Records available.—January 1, 1911, to December 31, 1911.

Drainage area.—74 square miles (measured from topographic sheet).

Gage.—Chain gage, location and datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from highway bridge at station during high water and by wading at ordinary stages.

Winter flow.—Little if any ice forms at this station.

Diversions.—There are court decrees for diversions of 22 second-feet from Eagle River and tributaries above the station; 18.5 second-feet of this amount for diversion to the Arkansas basin.

Accuracy.—Conditions are favorable for accurate results, and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Eagle River at Red Cliff, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 8	G. H. Russell	1.00	10.5	July 14	O. M. Wimmer	1.80	93.4
Feb. 10	O. M. Wimmer	1.05	8.5	Sept. 19	do	1.31	20.6
Mar. 29	do	1.32	19.0	Dec. 23	H. B. Waha	1.10	11.4
June 9	do	2.50	32.4				

Daily gage height, in feet, of Eagle River at Red Cliff, Colo., for 1911.

[S. D. Ackley, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	1.08	1.1	1.38	2.05	3.35	1.82	1.45	1.4	1.4	1.15	1.15
2	......	1.05	1.05	......	2.1	3.5	2.0	1.5	1.4	1.35	......	......
3	......	1.08	1.15	1.4	2.1	3.25	2.0	1.5	......	1.4	......	......
4	......	1.08	1.15	1.45	1.95	3.1	2.0	1.5	1.4	1.4	1.2	1.2
5	......	1.05	......	1.5	2.15	2.9	2.7	1.4	1.4	1.6	......	1.2
6	......	1.08	1.05	1.5	2.55	2.85	2.15	......	1.35	......	......	......
7	......	1.05	1.15	1.4	2.45	3.0	2.0	1.4	1.3	1.4	1.3	1.2
8	1.0	1.05	1.15	1.4	2.6	2.7	2.0	1.4	......	......	1.3	1.2
9	1.0	1.1	1.15	1.4	2.95	2.75	......	1.45	1.3	1.4	1.2	1.1
10	1.0	1.05	1.2	1.4	3.1	2.75	2.0	1.5	......	......	......	......
11	.98	1.05	1.2	1.4	......	2.1	2.0	1.75	1.3	1.4	1.25	1.1
12	.98	1.1	1.15	1.3	2.4	2.2	1.95	1.55	1.3	......	1.4	1.1
13	1.0	1.05	1.15	1.3	2.45	2.28	1.8	......	1.3	......	1.25	1.1
14	1.0	1.05	1.2	1.3	2.5	2.3	1.8	1.4	......	1.25	1.3	1.1
15	1.0	1.05	1.05	1.35	3.1	2.35	1.8	1.4	1.5	1.3	1.3	1.0
16	1.0	1.1	1.25	......	2.75	2.4	......	......	1.4	1.3	1.2	1.0
17	1.0	1.05	......	1.35	3.0	2.35	1.75	1.45	......	1.2	......	......
18	1.02	1.05	1.15	1.35	3.2	2.35	1.75	1.4	1.3	......	1.2	1.1
19	1.1	1.05	......	1.45	3.7	2.35	1.65	1.45	1.4	1.2	......	1.1
20	1.0	1.05	1.15	1.55	2.8	2.1	1.65	......	1.4	1.2	1.3	1.1
21	1.0	1.05	......	1.65	......	2.2	1.7	1.65	......	1.0	1.2	1.1
22	1.02	1.0	1.1	1.8	2.5	2.23	1.85	1.45	1.3	......	......	1.1
23	1.12	1.05	1.1	......	2.25	2.15	......	1.4	1.3	......	1.25	1.1
24	1.1	1.05	1.1	1.9	2.3	1.8	1.75	......	......	......	......	1.1
25	1.1	1.05	1.1	1.96	2.8	1.8	1.7	......	1.3	......	1.3	1.15
26	1.1	1.05	......	2.0	3.15	1.82	1.6	......	1.3	1.1	......	1.15
27	1.0	1.1	1.3	2.1	2.6	1.9	1.6	......	1.3	1.25	1.15	1.15
28	1.05	1.1	1.05	2.2	2.8	1.9	1.6	1.4	1.3	......	1.2	1.1
29	1.08	......	1.1	2.15	2.85	1.92	1.65	......	1.4	......	1.1	1.1
30	1.08	......	1.3	......	3.05	1.9	......	1.4	1.4	......	1.15	1.1
31	1.05	......	1.25	......	3.1	......	1.6	1.4	......	1.15	......	1.1

Note.—Slush ice running in river Oct. 21 and 26.

Daily discharge, in second-feet, of Eagle River at Red Cliff, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10	11	12	26	155	675	95	34	28	28	14	14
2	10	10	10	27	170	750	140	40	28	24	14	14
3	10	11	14	28	170	628	140	40	28	28	15	15
4	10	11	14	34	128	560	140	40	28	28	15	15
5	10	10	12	40	188	470	390	28	28	54	16	15
6	10	11	10	40	330	450	188	28	24	41	18	15
7	10	10	14	28	292	515	140	28	20	28	20	15
8	9.0	10	14	28	350	390	140	28	20	28	20	15
9	9.0	12	14	28	492	410	140	34	20	28	15	12
10	9.0	10	15	28	560	410	140	40	20	28	16	12
11	8.8	10	15	28	418	170	140	80	20	28	18	12
12	8.8	12	14	20	275	205	128	47	20	24	28	12
13	9.0	10	14	20	292	233	90	38	20	21	18	12
14	9.0	10	15	20	310	240	90	28	30	18	20	12
15	9.0	10	10	24	560	258	90	28	40	20	20	9.0
16	9.0	12	18	24	410	275	85	31	28	20	15	9.0
17	9.0	10	16	24	515	258	80	34	24	15	15	10
18	10	10	14	24	605	258	80	28	20	15	15	12
19	12	10	14	34	850	258	62	34	28	15	18	12
20	9.0	10	14	47	430	170	62	48	28	15	20	12
21	9.0	10	13	62	370	205	70	62	24	15	15	12
22	10	9.0	12	90	310	216	102	34	20	16	16	12
23	13	10	12	102	222	188	91	28	20	16	18	12
24	12	10	12	115	240	90	80	28	20	16	19	12
25	12	10	12	130	430	90	80	28	20	17	20	14
26	12	10	16	140	582	95	54	28	20	17	17	14
27	9.0	12	20	170	350	115	54	28	20	18	14	14
28	10	12	10	205	430	115	54	28	20	17	15	12
29	11	......	12	188	450	120	62	28	28	16	12	12
30	11	......	20	172	538	115	58	28	28	15	15	12
31	10	......	18	......	560	......	54	28	......	14	......	12

Note.—Discharge determined from a well-defined rating curve. Discharge Jan. 1 to 10 estimated at 10 second-feet; discharge interpolated for other days for which gage heights are missing.

Monthly discharge of Eagle River at Red Cliff, Colo., for 1911.

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	13	8.8	9.99	0.135	0.16	614	B.
February	12	9.0	10.5	.142	.15	583	B.
March	20	10	13.9	.188	.22	855	B.
April	205	20	64.9	.877	.98	3,860	B.
May	850	128	386	5.22	6.02	23,700	B.
June	750	90	298	4.03	4.50	17,700	B.
July	390	54	107	1.45	1.67	6,580	B.
August	80	28	35.0	.473	.55	2,150	B.
September	40	20	24.1	.326	.36	1,430	B.
October	54	14	22	.297	.34	1,350	B.
November	28	12	17.0	.230	.26	1,010	B.
December	15	9	12.6	.170	.20	775	B.
The year	850	8.8	83.4	1.13	15.41	60,600	

EAGLE RIVER AT EAGLE, COLO.

Location.—At the highway bridge at Eagle, in Eagle County, Colo., three-fourths of a mile above the mouth of Brush Creek.

Records available.—March 12, 1905, to February 10, 1907, at site a short distance below the mouth of Brush Creek; January 17, 1911, to December 11, 1911, at present site.

Drainage area.—580 square miles (measured from Forest atlas).

Gage.—Vertical staff. Referred to the same datum as the Weather Bureau gage nearby.

Channel.—Practically permanent.

Discharge measurements.—Made from highway bridge at ordinary and high stages, and by wading during low water.

Winter flow.—Ice causes backwater during the winter. Discharge measurements are made to determine the winter flow.

Diversions.—Between Eagle and the station at Red Cliff there are court decrees for diversions of 50 second-feet from Eagle River and for diversions of 286 second-feet from intervening tributaries. Between Eagle and the mouth there are decrees for 28 second-feet from Eagle River.

Accuracy.—Owing to the small number of gage heights the records can not be considered better than fair.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Eagle River at Eagle, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 18[a]	O. M. Wimmer	0.50	61	July 16	O. M. Wimmer	1.40	773
Feb. 24[a]	do	.95	89	Sept. 21	do	.60	243
Mar. 30	do	.28	118	Dec. 22[a]	H. B. Waha	1.00	158
June 8	do	3.60	2,690				

[a] Ice conditions.

Daily gage height, in feet, of Eagle River at Eagle, Colo., for 1911.

[J. B. Green, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			0.30		1.90		1.80	1.10				
2		0.43		0.39			1.70	1.00			.60	
3			.25			3.50	1.60	1.00				1.00
4		.47		.40		3.70		.90			.60	
5			.22			3.50		.85			.60	1.00
6		.11			2.60	3.50		.80	0.70			
7				.37	2.60	3.70			.70		.59	1.00
8					2.70	3.50			.60	0.51		
9		.35		.44	2.80	3.50			.55		.60	1.00
10					2.80				.55	.51		
11		.30	.27			3.50			.55		.60	1.00
12						3.40						
13		.32	.28					.80		.70		
14				.50		3.20		.80				
15		.39			2.90							
16						3.20	1.40	.80		.50	.60	
17	0.60	.29					2.60				.60	
18	.50		.23			3.20			.50			
19		.35			3.50	3.30		.70		.60		
20			.22	.65	2.70					.58	.60	
21		.75			2.70	3.00		1.20	.60	.56		
22		.75	.33			3.20		1.00	.60	.56	.60	1.00
23		.85		1.40				1.10	.60			
24	.60	.95								.60		
25					2.80	2.70	1.45	1.00	.60			
26						2.40	1.50	.90	.60	.60		
27	.70	.80	.26		2.80	2.40			.70	.60		
28	.50			1.80	3.00	2.20	1.35	.80	.70	.60	.56	
29					3.00	1.90	1.20		.65	.65		
30			.28	1.50	3.40	1.90	1.25		.60	.65		
31	.50						1.10					

Note.—Gage heights Jan. 17 to Feb. 27 and Dec. 3-31 affected by ice.

Daily discharge, in second-feet, of Eagle River at Eagle, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		60	125	146	1,180	2,550	1,090	555	336		255	225
2		60	120	161		2,580	1,010	485	329		250	225
3		65	108	163		2,600	930	485	322		250	225
4		65	102	165		2,790		420	315		250	105
5		65	97	162		2,600		390	308		250	105
6		65	95	158	1,770	2,600		360	300		245	190
7		65	90	153	1,770	2,790		360	300		246	190
8		65	95	168	1,860	2,600		360	250	210	250	190
9		65	100	181	1,950	2,600		360	228	210	250	190
10		65	105	185	1,950	2,600		360	228	210	250	190
11		70	115	190	1,960	2,600		360	228	210	250	175
12		70	116	195	1,980	2,500		360	225	250	250	175
13		70	118	200	2,000	2,410		360	222	300	250	175
14		70	114	205	2,020	2,320		360	218	230	250	175
15		70	110	210	2,040	2,320		360	215	205	250	175
16		75	106	210	2,190	2,320	775	360	212	205	250	160
17		75	103	220	2,340	2,320	1,260	340	208	220	250	160
18	61	75	100	230	2,450	2,320		320	205	240	250	160
19		75	98	240	2,600	2,410		300	230	250	250	160
20		75	97	275	1,860	2,260		450	250	241	250	160
21		89	117	325	1,860	2,130		625	250	232	250	158
22		89	137	550	1,880	2,320		485	250	232	250	158
23		89	131	775	1,910	2,160		555	250	241	247	158
24		89	126	835	1,930	2,010		520	250	250	244	150
25		89	121	900	1,950	1,860	812	485	250	250	241	150
26		95	116	960	1,950	1,600	850	420	250	250	238	140
27		95	111	1,020	1,950	1,600	794	390	300	250	235	140
28		95	113	1,090	2,130	1,430	738	360	300	250	232	140
29			116	970	2,130	1,180	625	353	275	275	230	140
30			118	850	2,500	1,180	662	347	250	275	230	140
31			132		2,530		555	341		260		140

Note.—Daily discharge determined from a well-defined rating curve. Discharge interpolated for days for which gage heights are missing except certain days in May, July, and October. Discharge for February and December determined from measurements, using gage heights indirectly.

Monthly discharge of Eagle River at Eagle, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 60.0	3,690	C.
February	95	60	74.8	4,150	B.
March	137	90	111	6,820	B.
April	1,090	146	403	24,000	C.
May 1 and 6–31	2,600	1,180	2,020	108,000	C.
June	2,790	1,180	2,250	134,000	C.
July, 12 days	1,260	555	842	20,000	B.
August	625	300	406	25,000	B.
September	336	205	258	15,400	B.
October 8–31	300	210	239	11,400	B.
November	255	230	246	14,600	B.
December	225	105	165	10,100	C.
The period				377,000	

[a] Estimated from discharge measurement.

HOMESTAKE CREEK AT RED CLIFF, COLO.

Location.—In sec. 30, T. 6 S., R. 80 W., one-fourth mile above the mouth of the creek and three-fourths of a mile from Red Cliff; below all tributaries.

Records available.—January 8, 1911, to December 31, 1911.

Drainage area.—64 square miles (measured from topographic sheet).

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading near by.

Winter flow.—Ice causes backwater, and discharge measurements are made to determine the winter flow.

Diversions.—There are court decrees for diversions of 1.2 second-feet from Homestake Creek.

Accuracy.—Data obtained at this station are good.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Homestake Creek at Red Cliff, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 8[a]	Russell and Wimmer	0.70	6.6	July 14	O. M. Wimmer	1.60	12.2
Feb. 10[a]	O. M. Wimmer	.70	10.4	Sept. 19	.....do	.60	17.1
Mar. 29	.....do	.65	17.4	Dec. 23[a]	H. B. Waha	.50	12.4

[a] Ice conditions.

Daily gage height, in feet, of Homestake Creek at Red Cliff, Colo., for 1911.

[S. D. Ackley, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	......	......	1.0	1.85	3.35	2.2	1.3	......	......	......	0.7
2	......	......	0.6	......	1.85	3.3	......	1.2	......	......	0.6	......
3	......	......	......	1.2	1.75	3.25	2.85	1.0	......	......	......	......
4	......	......	.6	1.3	1.8	......	......	......	......	......	......	.7
5	......	......	.7	......	2.4	3.6	2.85	1.0	......	1.8	......	......
6	......	......	.7	......	2.7	3.6	......	......	......	......	......	......
7	......	......	.6	1.1	3.0	3.7	2.7	1.0	......	......	......	.7
8	0.7	......	......	......	3.1	......	3.0	.9	......	......	.6	.7
9	......	......	......	......	3.3	3.4	......	......	0.6	1.3	......	......
10	......	0.7	.5	1.0	3.1	3.2	2.05	......	......	1.25	......	......
11	......	.8	.5	1.0	......	......	2.0	1.1	......	1.1	......	.6
12	......	......	......	.9	2.3	......	1.9	......	......	......	......	......
13	......	......	......	......	2.6	3.4	......	......	.6	.9	......	.5
14	......	......	......	......	......	3.05	1.6	......	.6	.8	......	......
15	......	......	.5	1.3	2.95	3.9	......	1.0	.6	......	.7	......
16	......	......	......	......	2.9	3.6	......	......	......	.7	......	......
17	......	......	.5	1.0	2.95	3.0	1.8	......	......	......	......	......
18	......	.6	.5	1.05	3.2	......	1.7	......	......	......	......	......
19	......	.6	......	1.4	3.25	3.25	......	......	.6	......	......	.5
20	......	......	.5	1.5	2.75	3.5	1.7	......	......	......	......	......
21	......	......	.5	1.7	......	3.25	1.7	......	......	......	......	.5
22	......	......	.5	1.95	2.1	3.2	2.0	......	......	......	......	......
23	......	......	1.0	......	2.3	2.9	......	......	......	......	......	.5
24	......	......	.6	1.85	2.55	2.8	2.0	......	......	......	.7	......
25	......	.6	.6	1.8	2.8	......	......	......	......	.6	......	......
26	......	......	......	1.7	3.0	2.3	1.9	......	......	......	......	.45
27	......	......	......	2.25	2.7	2.3	1.8	......	......	......	......	.45
28	......	......	......	2.6	3.0	......	......	......	.7	......	......	.45
29	......	......	.65	2.5	3.15	2.4	......	.8	......	......	......	......
30	......	......	.6	......	3.3	2.25	......	......	.8	......	.7	.45
31	......	......	......	......	3.15	......	1.4	......	......	......	......	......

NOTE.—Gage heights Jan. 1 to Mar. 7, Mar. 23, and from Dec. 1 to 31, affected by ice.

Daily discharge, in second-feet, of Homestake Creek at Red Cliff, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	......	10	45	168	650	250	79	24	53	15	......
2	......	......	10	56	168	630	354	67	23	79	15	......
3	......	......	10	67	149	610	458	45	22	105	15	......
4	......	......	10	79	158	682	458	45	21	132	15	......
5	......	......	10	72	305	755	458	45	20	158	15	......
6	......	......	10	64	405	755	432	45	19	138	15	......
7	......	......	10	56	510	800	405	45	18	119	15	......
8	6.6	......	10	52	550	735	510	35	16	99	15	......
9	......	......	10	48	630	670	361	42	15	79	15	......
10	......	10	10	45	550	590	212	49	15	73	16	......
11	......	......	10	45	412	616	200	56	15	56	17	......
12	......	......	10	35	275	642	178	53	15	46	18	......
13	......	......	10	50	370	670	150	50	15	35	19	......
14	......	......	10	64	431	530	122	48	15	27	20	......
15	......	......	10	79	492	890	134	45	15	24	20	......
16	......	......	10	62	475	755	146	44	15	20	20	......
17	......	......	10	45	492	510	158	43	15	20	20	......
18	......	......	10	50	590	560	140	42	15	19	20	......
19	......	......	10	93	610	610	140	41	15	18	20	......
20	......	......	10	107	418	710	140	40	15	18	20	......
21	......	......	10	140	312	610	140	39	16	17	20	......
22	......	......	10	189	225	590	200	38	16	16	20	......
23	......	......	12	178	275	475	200	37	17	16	20	12
24	......	......	15	168	348	440	200	36	18	15	20	......
25	......	......	15	158	440	358	189	34	19	15	20	......
26	......	......	15	140	510	275	178	32	19	15	20	......
27	......	......	16	262	405	275	158	30	20	15	20	......
28	......	......	17	370	510	290	142	28	20	15	20	......
29	......	......	18	335	570	305	125	27	24	15	20	......
30	......	......	15	252	630	262	109	26	27	15	20	......
31	......	......	30	......	570	......	93	25	......	15	......	......

NOTE.—Daily discharge computed from a well-defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Homestake Creek at Red Cliff, Colo., for 1911.

[Drainage area, 64 square miles]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a] 8.0	0.125	0.14	492	D.
February			[a] 10.0	.156	.16	555	D.
March	30	10	12.0	.187	.22	738	C.
April	370	45	114	1.78	1.99	6,780	B.
May	630	149	418	6.53	7.53	25,700	B.
June	890	262	575	8.98	10.02	34,200	B.
July	510	93	230	3.59	4.14	14,100	B.
August	79	25	42.3	.661	.76	2,600	C.
September	27	15	18.0	.281	.31	1,070	C.
October	158	15	48.0	.750	.86	2,950	C.
November	20	15	18.2	.284	.32	1,080	C.
December			[a] 13.0	.203	.23	799	D.
The year	890		125	1.95	26.68	91,000	

[a] Estimated from discharge measurements, comparison, and climatologic data.

GORE CREEK NEAR MINTURN, COLO.

Location.—In sec. 22, T. 5 S., R. 81 W., 200 feet above the mouth of the creek, 1 mile northwest of Minturn. Nearest tributary, Willow Creek, enters 2 miles above the station.

Records available.—July 15, 1911, to December 31, 1911.

Drainage area.—98 square miles (measured from Forest atlas).

Gage.—Inclined staff.

Channel.—Apparently permanent.

Discharge measurements.—Made from the railroad bridge near by during high water and by wading during ordinary stages.

Winter flow.—Ice causes backwater during winter months; discharge measurements are made to determine the winter flow.

Diversions.—There are court decrees for diversion of 5.7 second-feet from Gore Creek, and 2.5 second-feet from a tributary entering above.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Gore Creek near Minturn, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 15	O. M. Wimmer	1.70	166
Sept. 20	do	1.10	46.3
Dec. 22[a]	H. B. Waha	1.35	20.2

[a] Ice conditions.

Daily gage height, in feet, and discharge, in second-feet, of Gore Creek near Minturn, Colo., for 1911.

[G. W. Gustafson, observer.]

Day.	July.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1										
2										
3										
4					1.2	58				
5									1.6	
6					1.4	98				
7					1.3	78	1.0	26		
8										
9							1.0	26	1.7	
10					1.25	68	1.0	26		
11										
12					1.2	58				
13					1.2	58				
14							1.3		1.9	
15	1.7	166								
16									1.9	
17										
18							1.1	41		
19										
20			1.1	41						
21										
22							1.5		1.35	
23					1.1	41			1.0	
24							.95	22		
25									1.0	26
26										
27							1.0	26		
28					1.1	41				
29										
30							1.3		1.0	26
31										

NOTE.—Gage heights Nov. 14 and 22 and from Nov. 30 to Dec. 31 affected by ice. Daily discharge determined from a fairly well defined rating curve.

BEAVER CREEK AT AVON, COLO.

Location.—On highway bridge in sec. 12, T. 5 S., R. 82 W., 300 feet above mouth of creek. Nearest tributary, a small stream that enters from the west 1½ miles above the station.

Records available.—February 25, 1911, to December 31, 1911.

Drainage area.—15 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading except during flood stage, when they are made from bridge.

Winter flow.—Practically no backwater from ice at this station.

Diversions.—There are court decrees for diversions of 12 second-feet from Beaver Creek above the station.

Accuracy.—Results are fairly good.

Cooperation.—Station maintained in cooperation with United States Forest Service.

Discharge measurements of Beaver Creek at Avon, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 25	O. M. Wimmer	0.38	4.6	Sept. 20	O. M. Wimmer	0.56	7.5
Mar. 30	....do	.40	5.0	Dec. 22	H. B. Waha	.40	4.6
July 15	....do	.68	11.8				

Daily gage height, in feet, of Beaver Creek at Avon, Colo., for 1911.

[I. T. Starbuck, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			0.40	0.70	1.62	0.70	0.60	0.40	0.60	0.50	
2				.65	1.65	.80	.60	.40		.50	0.40
3			.50		1.60	1.20	.60	.40	.60	.50	.40
4		0.33		.72	1.65	1.20	.55	.50		.50	.40
5			.45	.85	1.70	1.20	.45	.50		.50	.40
6				.98	1.65	1.50	.30			.50	.40
7		.25		1.10	1.70	1.30	.12		.60	.50	
8			.50	1.20	1.70	1.15	.04	.40	.60	.50	.40
9				1.32	1.70	1.05	.00	.40	.60	.50	.40
10				1.35	1.60	1.00	.25	.40	.60	.50	.40
11		.35		1.15		.90	.12	.40	.50	.45	.40
12				1.10		.80	.18		.50	.30	.40
13			.40	1.20		.70	.10		.50	.30	.40
14				1.20		.70	.10	.50	.50		.40
15			.40	1.45		.60	.10	.50	.50	.40	.40
16				1.50		.60	.10	.50		.40	.40
17				1.50		.60	.10	.50	.50	.40	.40
18		.30		1.50		.60	.10	.50	.50	.40	.40
19			.45	1.60		.70			.50		.40
20			.45			.70	.20	.56	.40	.40	.40
21			.42			.70	.40		.40	.40	.40
22			.60	1.20		.70		.50	.40	.40	.40
23		.33	.55		1.60	.70	.60	.50	.40		.40
24			.58		1.50	.70	.55	.50	.40	.40	.40
25	0.38	.40	.56				.50	.50	.40	.40	.40
26			.60	1.60	1.00	.60	.50	.40	.40	.40	.40
27			.65	1.50	1.00	.60			.50	.40	.40
28			.69	1.50	1.00	.60	.40		.50	.40	.40
29			.70	1.50	1.00	.60	.40	.50	.50	.40	.40
30		.40		1.50	.80	.65	.40	.55	.50	.40	.40
31				1.62		.60	.40		.50		

Daily discharge, in second-feet, of Beaver Creek at Avon, Colo., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		4.0	4.5	12	90	12	9.0	4.5	9.0	6.5	4.5
2		4.0	5.5	11	94	17	9.0	4.5	9.0	6.5	4.5
3		3.9	6.5	12	88	47	9.0	4.5	9.0	6.5	4.5
4		3.8	6.0	13	94	47	7.8	6.5	9.0	6.5	4.5
5		3.6	5.5	20	100	47	5.5	6.5	9.0	6.5	4.5
6		3.3	5.8	29	94	77	3.5	5.8	9.0	6.5	4.5
7		3.0	6.2	38	100	56	2.1	5.2	9.0	6.5	4.5
8		3.3	6.5	47	100	42	1.7	4.5	9.0	6.5	4.5
9		3.6	6.1	58	100	34	1.5	4.5	9.0	6.5	4.5
10		3.8	5.7	61	88	30	3.0	4.5	9.0	6.5	4.5
11		4.0	5.3	42	88	23	2.1	4.5	6.5	5.5	4.5
12		4.0	4.9	38	88	17	2.4	5.2	6.5	3.5	4.5
13		3.9	4.5	47	88	12	2.0	5.8	6.5	3.5	4.5
14		3.8	4.5	47	88	12	2.0	6.5	6.5	4.0	4.5
15		3.7	4.5	72	88	9.0	2.0	6.5	6.5	4.5	4.5
16		3.6	4.8	77	88	9.0	2.0	6.5	6.5	4.5	4.5
17		3.5	5.0	77	88	9.0	2.0	6.5	6.5	4.5	4.5
18		3.5	5.2	77	88	9.0	2.0	6.5	6.5	4.5	4.5
19		3.5	5.5	88	88	12	2.2	7.2	6.5	4.5	4.5
20		3.6	5.5	74	88	12	2.5	8.0	4.5	4.5	4.5
21		3.7	4.9	61	88	12	4.5	7.2	4.5	4.5	4.5
22		3.8	9.0	47	88	12	6.7	6.5	4.5	4.5	4.5
23		3.8	7.8	57	88	12	9.0	6.5	4.5	4.5	4.5
24		4.2	8.5	67	77	12	7.8	6.5	4.5	4.5	4.5
25	4.3	4.5	8.0	78	54	10	6.5	6.5	4.5	4.5	4.5
26		4.5	9.0	88	30	9.0	6.5	4.5	4.5	4.5	4.5
27		4.5	11	77	30	9.0	5.5	5.2	6.5	4.5	4.5
28		4.5	12	77	30	9.0	4.5	5.8	6.5	4.5	4.5
29		4.5	12	77	30	9.0	4.5	6.5	6.5	4.5	4.5
30		4.5	12	77	17	11	4.5	7.8	6.5	4.5	4.5
31		4.5		90		9.0	4.5		6.5		4.5

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Beaver Creek at Avon, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 4.00	246	D.
February			[a] 4.00	222	D.
March	4.5	3.0	3.88	239	B.
April	12	4.5	6.74	401	B.
May	90	11	56.0	3,440	C.
June	100	17	78.7	4,680	C.
July	77	9.0	20.9	1,290	B.
August	9.0	1.5	4.45	274	B.
September	8.0	4.5	5.91	352	B.
October	9.0	4.5	6.86	422	B.
November	6.5	3.5	5.12	305	B.
December	4.5	4.5	4.50	277	B.
The year	100		16.8	12,100	

[a] Estimated.

BRUSH CREEK AT EAGLE, COLO.

Location.—At railroad bridge in sec. 6, T. 5 S., R. 84 W., three-fourths of a mile west of Eagle and 300 yards above the mouth of the creek. Nearest tributary a small stream that enters from the south half a mile above the station.

Records available.—January 1, 1911, to December 31, 1911.

Drainage area.—146 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made from footbridge and by wading near by.

Winter flow.—Ice causes some backwater during the winter months. Measurements are made to determine the discharge.

Diversions.—There are court decrees for diversions of 115 second-feet from Brush Creek, and 27 second-feet from tributaries—all above the station.

Accuracy.—Although gage heights are scattering, good results have been obtained by means of comparison with flow at other streams and from climatologic data.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Brush Creek at Eagle, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 18	O. M. Wimmer	0.31	34.8	July 15	O. M. Wimmer	0.60	61.6
Feb. 24	do	.43	41.5	Sept. 21	do	.52	50.1
Mar. 30	do	.36	33.4	Dec. 21 [a]	H. B. Waha	.55	33.0
June 9	do	1.10	165				

[a] Ice conditions.

Daily gage height, in feet, of Brush Creek at Eagle, Colo., for 1911.

[J. B. Green, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1					0.70			0.32			0.60	
2				0.39			0.40					
3		0.43				0.70	.64	.20	0.35		.58	1.20
4			0.70			.72	.55					
5						.76	.58				.61	1.20
6		.32			.79	.75		.00			.65	
7						.75		−.10	.35			1.20
8		.40		.32	.79				.35	.50		
9				.38	.80	1.20			.35		.63	
10		.45	.53	.32	.83	1.10			.35	.50		
11		.30	.48			1.03		−.20			.61	1.20
12												
13					.87	1.00				.50	.59	
14		.39	.32							.54		
15				.32	.90	1.00	.60				.60	
16		.38	.33			.90					.60	
17		.33		.32			.60	−.30		.50		
18	0.31	.32				.73						
19		.32			.70			.00	.30	.50	.56	
20		.33	.36		.70	.71		.00		.50		
21					.70			.00	.52	.51		.55
22				.35		.72			.40	.54	.54	
23		.50	.30	.40						.50	.54	
24		.43			.70				.58			
25					.70	.71	.60	.20	.55	.54		
26					.70			.40			.54	
27	.40	.72	.35		.70	.70			.60	.50		
28	.35			.67			.60					
29					.80	.68	.50			.55		
30	.32		.38				.50		.60	.62		
31							.40					

NOTE.—Gage heights affected by ice Feb. 23, 24, 27, and from Dec. 3 to 31.

Daily discharge, in second-feet, of Brush Creek at Eagle, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	35	36	44	37	77	84	50	32	35	60	62	
2	35	38	45	37	81	80	38	28	34	60	60	
3	35	41	46	36	85	77	68	24	34	58	59	
4	35	38	47	35	88	81	56	21	34	56	62	
5	35	35	48	34	91	88	59	18	34	54	64	
6	35	32	49	33	94	87	59	15	34	52	70	
7	35	35	50	32	94	87	59	11	34	50	68	
8	35	38	51	32	94	140	60	10	34	49	67	
9	35	41	52	36	96	192	60	9	34	49	66	
10	35	44	53	32	102	165	60	8	34	49	65	
11	35	30	47	32	105	148	61	8	34	49	64	
12	35	32	42	32	108	144	61	8	33	49	62	
13	35	34	37	32	110	140	62	7	33	49	61	
14	35	37	32	32	114	140	62	6	32	54	61	
15	35	36	32	32	117	140	62	6	32	52	62	
16	35	36	32	32	107	117	62	5	31	50	62	
17	35	32	32	32	97	100	62	5	31	49	60	
18	35	32	33	32	87	83	62	10	30	49	58	
19	35	32	34	33	77	81	62	15	30	49	57	
20	36	32	35	33	77	79	62	15	41	49	56	
21	36	34	34	34	77	80	62	15	52	50	56	33
22	36	36	32	34	77	81	62	17	38	54	55	
23	37	38	30	38	77	80	62	19	48	49	55	
24	37	39	31	44	77	80	62	22	59	52	55	
25	37	40	32	51	77	79	62	24	56	54	55	
26	38	41	33	58	77	78	62	38	59	52	55	
27	38	42	34	65	77	77	62	38	62	49	50	
28	34	43	34	72	86	76	62	37	62	52	50	
29	33		35	74	96	74	49	37	62	56	50	
30	32		36	76	92	62	49	36	62	65	50	
31	34		36		88		38	36		64		

NOTE.—Discharge determined from a fairly well defined rating curve. Discharge Jan. 1 to 17 estimated at 35 second-feet. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Brush Creek at Eagle, Colo., for 1911.

[Drainage area, 120 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	38	32	35.3	2,170	C.
February	44	30	36.6	2,030	C.
March	53	30	39.0	2,400	C.
April	76	32	40.4	2,400	B.
May	117	77	90.4	5,560	C.
June	192	62	101	6,010	C.
July	68	38	58.7	3,610	C.
August	38	5	18.7	1,150	C.
September	62	30	40.9	2,430	B.
October	65	49	52.7	3,240	B.
November	70	50	59.2	3,520	B.
December			[a] 33	2,030	D.
The year	192	5	50.5	36,600	

[a] Estimated from discharge measurements.

NO NAME CREEK BASIN.

NO NAME CREEK NEAR GLENWOOD SPRINGS, COLO.

Location.—In sec. 5, T. 5 S., R. 88 W., 4 miles from Glenwood Springs, and 1½ miles above the mouth of the creek. Nearest tributary, a small stream that enters some distance below the station.

Records available.—January 5, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge measurements.—Made by wading near by or from footbridge.

Diversions.—No water is diverted above the station, but the records do not represent the natural run-off of the drainage basin, as about half the run-off of Grizzly Creek is diverted into No Name Creek above the station. A short distance below the station are the head works of the Glenwood Light & Water Co. canal which has a decree for 12 second-feet.

Accuracy.—As the station has not yet been completely rated, estimates of discharge can not be made.

Cooperation.—Station maintained in cooperation with the United States Forest Service and the Glenwood Light & Water Co.

Discharge measurements of No Name Creek near Glenwood Springs, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 5[a]	Russell and Wimmer	2.35	19.6
Feb. 22	O. M. Wimmer	2.32	19.0
Dec. 20	H. B. Waha	2.43	28.4

[a] Slight ice effect.

Daily gage height, in feet, of No Name Creek near Glenwood Springs, Colo., for 1911.

[O. O. V. Hann, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	2.35	2.35	....	2.68	3.57	2.83	2.55	2.43	2.73	2.54	2.51
2	....	2.40	2.34	2.47	2.65	3.60	2.83	2.55	2.51	2.65	2.55	2.50
3	....	2.35	....	2.55	2.64	3.61	2.87	2.51	2.55	2.63	2.51	2.50
4	....	....	2.37	2.60	2.69	3.70	2.81	2.49	2.53	2.63	2.40	2.50
5	2.35	....	....	2.56	2.80	3.75	2.80	2.47	2.51	2.15	2.53	2.50
6	2.40	....	....	2.55	2.85	3.80	2.77	2.45	2.51	2.85	2.53	2.48
7	2.00	....	....	2.54	2.87	3.85	2.73	2.45	2.50	2.75	2.44	2.50
8	2.35	....	....	2.58	2.93	3.81	2.70	2.43	2.49	2.71	2.55	2.50
9	2.35	....	....	2.52	3.07	3.87	2.69	2.43	2.49	2.69	2.54	2.48
10	2.40	....	....	2.52	3.01	3.83	2.55	2.43	2.49	2.65	2.53	2.48
11	2.55	....	2.50	2.51	2.99	3.79	2.63	2.45	2.47	2.63	2.49	2.48
12	2.60	....	....	2.51	2.83	3.75	2.60	2.45	2.48	2.63	2.45	2.48
13	2.70	....	....	2.50	2.91	3.89	2.60	2.44	2.49	2.63	2.50	2.49
14	2.70	....	2.45	2.50	2.90	3.80	2.60	2.43	2.49	2.63	2.55	2.47
15	2.35	2.35	....	2.50	3.00	3.79	2.57	2.42	2.51	....	2.50	2.49
16	2.35	....	....	2.49	3.00	3.65	2.55	2.40	2.49	....	2.55	2.48
17	2.35	....	....	2.51	3.10	3.55	2.57	2.39	2.47	....	2.43	2.46
18	2.35	....	2.42	2.52	3.10	3.45	2.53	2.50	2.45	....	2.51	2.45
19	2.35	....	....	2.54	3.15	3.50	2.55	2.50	2.44	....	2.53	2.44
20	2.35	2.40	....	2.57	3.10	3.45	2.53	2.51	2.45	....	2.52	2.43
21	2.40	....	....	2.59	3.05	3.55	2.51	2.52	2.43	....	2.53	2.44
22	2.35	2.32	....	2.61	3.05	3.40	2.61	2.50	2.19	2.53	2.53	2.43
23	2.35	....	....	2.64	3.15	3.25	2.55	2.51	2.19	2.55	2.43	2.42
24	2.35	....	....	2.66	3.20	3.15	2.49	2.50	2.20	2.55	2.45	2.43
25	2.35	....	....	2.67	3.25	3.05	2.47	2.49	2.51	2.57	2.49	2.41
26	2.35	....	....	2.68	3.45	2.99	2.46	2.47	2.55	2.57	2.51	2.43
27	2.40	2.36	....	2.69	3.40	2.95	2.46	2.46	2.57	2.59	2.50	2.41
28	2.35	....	....	2.70	3.40	2.90	2.45	2.45	2.59	2.59	2.49	2.43
29	2.35	....	....	2.72	3.50	2.89	2.57	2.45	2.57	2.57	2.73	2.43
30	2.35	....	....	2.70	3.50	2.88	2.56	2.45	2.75	2.55	2.53	2.42
31	2.40	....	....	....	3.55	....	2.55	2.43	....	2.53	....	....

GLENWOOD LIGHT & WATER CO.'S FLUME NEAR GLENWOOD SPRINGS, COLO.

Location.—In sec. 32, T. 5 S., R. 88 W., 60 feet below the headgate of the flume, and about 4 miles from Glenwood Springs.

Records available.—January 1 to December 31, 1911.

Gage.—Vertical staff.

Channel.—As this station is in a flume the channel should be practically permanent.

Discharge measurements.—Made from top of flume.

Diversions.—No water is diverted above the station so far as known.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the Glenwood Light & Water Co.

Discharge measurements of Glenwood Light & Water Co.'s flume near Glenwood Springs, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 5	O. M. Wimmer	1.05	18.2
Feb. 22	....do	1.20	19.3
Dec. 20	H. B. Waha	1.20	15.9

Daily gage height, in feet, of Glenwood Light & Water Co.'s flume near Glenwood Springs, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	1.07	1.04	......	1.12	1.12	1.12	1.12	1.12	1.12	1.20	1.20
2	......	1.07	1.04	1.10	1.12	1.12	1.12	1.12	1.12	1.12	1.20	1.20
3	......	1.07	......	1.11	1.12	1.12	1.12	1.12	1.12	1.12	1.20	1.20
4	......	......	1.06	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.20	1.20
5	1.05	......	......	1.10	1.12	1.12	1.12	1.12	1.12	1.13	1.20	1.20
6	1.07	......	......	1.10	1.12	1.12	1.11	1.12	1.12	1.12	1.20	1.20
7	1.01	......	......	1.10	1.12	1.11	1.11	1.12	1.12	1.12	1.20	1.20
8	1.07	......	......	1.10	1.12	1.12	1.12	1.12	1.12	1.20	1.20	1.20
9	1.07	......	......	1.10	1.13	1.12	1.12	1.12	1.12	1.20	1.20	1.20
10	1.07	......	......	1.10	1.12	1.12	1.11	1.12	1.12	1.20	1.20	1.20
11	1.09	......	1.19	1.10	1.11	1.12	1.12	1.12	1.12	1.20	1.20	1.20
12	1.09	......	......	1.10	1.11	1.10	1.12	1.12	1.12	1.20	1.20	1.20
13	1.09	......	......	1.09	1.12	1.10	1.12	1.12	1.12	1.20	1.20	1.20
14	1.09	......	......	1.09	1.12	1.12	1.12	1.12	1.12	1.20	1.20	1.20
15	1.05	1.10	......	1.08	1.12	1.12	1.12	1.11	1.12	......	1.20	1.20
16	1.05	......	......	1.08	1.12	1.12	1.12	1.11	1.12	......	1.20	1.20
17	1.05	......	......	1.08	1.12	1.11	1.12	1.11	1.12	......	1.20	1.20
18	1.07	......	1.12	1.09	1.12	1.12	1.12	1.12	1.12	......	1.20	1.20
19	1.07	......	......	1.10	1.12	1.12	1.12	1.12	1.12	......	1.20	1.20
20	1.07	1.15	......	1.10	1.12	1.11	1.12	1.12	1.12	......	1.20	1.20
21	1.07	......	......	1.10	1.12	1.12	1.12	1.12	1.12	......	1.20	1.20
22	1.07	1.05	......	1.11	1.12	1.11	1.12	1.12	.75	1.20	1.20	1.20
23	1.07	......	......	1.11	1.12	1.11	1.12	1.12	.75	1.20	1.20	1.20
24	1.07	......	......	1.12	1.12	1.10	1.12	1.12	.80	1.20	1.20	1.20
25	1.07	......	......	1.12	1.12	1.11	1.12	1.12	1.12	1.20	1.20	1.15
26	1.07	......	......	1.12	1.12	1.08	1.12	1.12	1.12	1.20	1.20	1.15
27	1.07	1.05	......	1.12	1.12	1.12	1.12	1.12	1.12	1.20	1.20	1.15
28	1.07	......	......	1.12	1.12	1.12	1.12	1.12	1.12	1.20	1.20	1.20
29	1.07	......	......	1.12	1.12	1.12	1.12	1.12	1.12	1.20	1.20	1.20
30	1.07	......	......	1.12	1.12	1.12	1.12	1.12	1.12	1.20	1.20	1.20
31	1.07	......	......	......	1.12	......	1.12	1.12	......	1.20	......	......

ROARING FORK BASIN.

ROARING FORK AT ASPEN, COLO.

Location.—In sec. 7, T. 10 S., R. 84 W., at Aspen; above Castle, Maroon, and Hunter creeks.

Records available.—January 1, 1911, to December 31, 1911.

Drainage area.—109 square miles (measured from topographic sheet).

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge measurements.—Made by wading except during high water when they are made from bridge near gage.

Winter flow.—Ice causes backwater during the winter months, and discharge measurements are made to determine the winter flow.

Diversions.—The Salvation ditch, which has a decree for 42 second-feet, diverts water above the station from the middle of May to the middle of September.

Accuracy.—Fairly good results have been obtained at this station.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Roaring Fork at Aspen, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 1[a]	Russell and Wimmer..	0.70	31.7	July 21	O. M. Wimmer........	1.70	311
Feb. 15	O. M. Wimmer........	.00	25.3	Sept. 25	.....do................	.50	67.6
Apr. 2	.....do................	.40	72.4	Dec. 26[a]	.....do................	.70	25.1

[a] Ice conditions.

Daily gage height, in feet, of Roaring Fork at Aspen, Colo., for 1911.

[S. C. Swearengin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.7	0.1	0.0	......	1.0	3.0	2.0	......	0.4	......	......	......
2	.7	.1	.0	0.3	.9	3.1	......	......	.4	......	0.3	1.7
3	.7	.0	.0	.4	.9	3.0	2.6	......	......	......	......	......
4	.9	.0	.0	.5	1.0	3.3	......	......	.4	......	......	......
5	.7	.1	.0	.4	1.4	3.3	......	......	......	......	......	1.7
6	.6	.2	.0	.4	1.7	3.4	......	......	......	......	......	1.3
7	.5	.2	.0	.4	1.8	3.3	2.3	0.8	......	......	......	......
8	.6	.2	.1	.4	2.0	3.6	2.3	.8	.3	......	.4	......
9	.6	.2	.1	.4	2.2	3.5	......	.7	.2	......	.4	1.0
10	.5	.2	.1	.3	2.0	3.2	......	.8	.2	......	.4	......
11	.4	.2	.1	.3	1.7	2.2	1.9	......	.2	......	.4	......
12	.3	.0	.1	.2	......	......	......	......	......	......	......	1.4
13	.3	.1	.1	.1	1.7	3.55	......	......	......	......	.8	......
14	.5	.1	.1	.2	1.7	3.4	......	......	......	0.9	.6	......
15	.2	.0	.1	.3	1.9	3.5	1.7	......	......	......	.6	1.7
16	......	.0	.1	.3	1.9	......	1.8	.8	......	......	.4	......
17	.2	.0	.1	.2	2.0	3.0	2.3	......	......	......	......	1.5
18	.2	.1	.1	.2	2.1	......	1.7	.7	......	......	.4	......
19	.7	.0	.1	.2	2.3	3.1	......	.7	......	.7	......	......
20	.2	.1	.1	......	2.0	3.1	......	......	.6	......	.4	......
21	.2	.1	.1	.5	1.8	3.1	1.7	......	......	......	......	......
22	.1	.1	.1	.7	1.7	3.2	......	......	.6	......	.3	......
23	.2	.1	.1	.7	......	3.2	......	......	.7	......	.4	1.4
24	......	.1	.1	.8	1.9	3.1	......	.8	......	......	.6	......
25	......	.0	.1	.8	2.0	......	......	.8	.5	......	......	......
26	.1	.1	.0	.9	2.3	2.4	......	.7	......	......	......	.7
27	.2	.1	.2	1.0	2.1	2.4	......	......	......	......	.4	......
28	.2	.0	.1	1.2	2.3	......	......	......	.6	.5	......	......
29	.1	......	.2	1.2	2.5	......	......	.6	......	......	......	.5
30	.0	......	.3	1.05	2.4	......	......	......	......	.4	......	......
31	.1	......	.3	......	2.7	......	......	.4	......	.3	......	......

NOTE.—Gage heights from Jan. 1 to Mar. 14, Nov. 13 to 15, Nov. 24, and Dec. 1 to 31 affected by ice.

Daily discharge, in second-feet, of Roaring Fork at Aspen, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	32	......	25	52	152	690	390	130	63	......	52	60
2	......	......	25	52	135	720	480	130	63	......	52	60
3	......	......	25	63	135	690	570	125	63	......	54	60
4	......	......	27	75	152	780	550	125	63	......	56	55
5	......	......	27	63	235	780	525	120	60	......	58	55
6	......	......	30	63	310	815	500	120	58	......	60	50
7	......	......	30	63	335	780	480	118	55	......	62	50
8	......	......	30	63	390	885	480	118	52	......	63	50
9	......	......	30	63	450	850	440	102	42	......	63	50
10	......	......	30	52	390	750	400	118	42	......	63	50
11	......	......	33	52	310	750	360	118	42	......	63	50
12	......	......	33	42	310	809	350	118	......	......	63	50
13	......	......	33	33	310	868	340	118	......	......	63	50
14	......	......	33	42	310	815	325	118	......	135	63	50
15	......	25	33	52	360	850	310	118	......	127	63	50
16	......	......	33	52	360	770	335	118	......	119	63	45
17	......	......	33	42	390	690	480	110	......	112	63	45
18	......	......	33	42	420	705	310	102	......	105	63	45
19	......	......	33	42	480	720	310	102	......	102	63	45
20	......	......	33	58	390	720	310	105	88	99	63	45
21	......	......	33	75	335	720	310	108	88	96	58	40
22	......	......	33	102	310	750	......	111	88	93	52	40
23	......	......	33	102	335	750	......	114	102	90	63	40
24	......	......	33	118	360	720	......	118	88	87	63	40
25	......	......	33	118	390	615	......	118	75	84	63	40
26	......	......	25	135	480	510	......	102	80	81	63	25
27	......	......	42	152	420	510	......	97	84	78	63	25
28	......	......	33	190	480	480	......	92	88	75	63	25
29	......	......	42	190	540	450	......	88	88	69	63	25
30	......	......	52	161	510	420	......	76	88	63	63	25
31	......	......	52	......	600	......	......	63	......	52	......	25

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge interpolated for days for which gage heights are missing except for certain days in July, September, and October. Daily discharge for December based on measurement made December 26.

Monthly discharge of Roaring Fork at Aspen, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 30.0	1,840	D.
February			[a] 25.0	1,390	D.
March	52	25	32.9	2,020	C.
April	190	33	80.3	4,780	C.
May	600	135	358	22,000	C.
June	885	420	712	42,400	C.
July, 21 days	570	310	407	16,900	C.
August	130	63	110	6,760	C.
September, 22 days	102	42	70.9	2,990	C.
October, 18 days	135	52	92.6	3,300	C.
November	63	52	60.9	3,620	C.
December	60	25	44.0	2,710	C.
The period				111,000	

[a] Estimated from discharge measurements.

ROARING FORK AT GLENWOOD SPRINGS, COLO.

Location.—On bridge 500 feet above the mouth of the river in Glenwood Springs. Nearest important tributary enters about 3 miles above the station.

Records available.—April 6, 1906, to September 30, 1909; September 21, 1910, to December 31, 1911.

Drainage area.—1,450 square miles (Nell's map of Colorado, 1903).

Gage.—Chain gage; location and datum unchanged.

Channel.—Practically permanent, but rough. Extremely high water in Grand River may cause backwater at the gage.

Discharge measurements.—Made from highway bridge.

Winter flow.—Surface ice rarely forms entirely across the river, but slush and anchor ice frequently occur. Discharge measurements sometimes show backwater from ice.

Diversions.—There are court decrees for diversions of 196 second-feet from Roaring Fork above the station, and 795 second-feet from the various tributaries.

Accuracy.—Conditions are favorable for accurate results, and the estimates should be reliable.

Cooperation.—Since 1910 the station has been maintained in cooperation with the United States Forest Service.

Discharge measurements of Roaring Fork at Glenwood Springs, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 20	O. M. Wimmer	1.05	333	June 14	W. B. Freeman	5.70	7,770
21	.....do	1.05	349	July 17	O. M. Wimmer	3.55	3,240
25	R. H. Fletcher	1.18	426	Sept. 22	.....do	1.75	863
Mar. 11	Thos. Grieve	1.55	607	26	G. H. Russell	1.72	734
Apr. 1	O. M. Wimmer	1.61	639	Oct. 14	C. L. Chatfield	2.20	1,170
May 7	J. B. Stewart	3.55	3,090	Dec. 19	O. M. Wimmer	1.35	559

Daily gage height, in feet, of Roaring Fork at Glenwood Springs, Colo., for 1911.

[H. H. French, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Sept.	Oct.	Nov.	Dec.
1		1.6	1.1	1.7	2.65				3.2	1.55	
2		1.2	1.1	1.75	2.5				2.9		1.5
3		1.2	1.1		2.5				2.6	1.7	1.5
4		1.2	1.15		2.6				2.3		
5		1.1	1.2		3.0	5.5			4.4	2.15	1.6
6		1.1	1.3		3.6	5.8			3.8		1.5
7	1.3	1.1	1.3		3.7				3.3	1.5	1.5
8	1.3	1.1	1.3	1.65	4.2					1.7	1.4
9	1.3	1.0	1.75	1.7	4.5					1.7	1.3
10	1.4	1.1	1.7	1.7	4.2					1.7	
11	1.6	1.2	1.7	1.7	3.8				2.4	1.65	1.4
12	1.25		1.35	1.65	3.6				2.3		1.3
13	1.2	1.2	1.25	1.6	3.8				2.2	1.5	
14	1.2	1.1	1.25	1.55		5.7			2.2	1.65	1.15
15		1.15	1.3	1.45	4.2			1.8		1.5	
16		1.15	1.3		4.2				2.1	1.5	1.4
17		1.15	1.3	1.65	4.2		3.6			1.4	
18		1.1	1.3	1.6	4.4			1.75	2.0	1.45	1.4
19		1.1		1.7	4.7			1.65	1.9		1.4
20		1.05	1.3	1.95	4.0						1.3
21		1.1		2.1	3.7			1.8	2.2	1.5	1.2
22			1.4	2.3	3.6			1.75		1.5	
23	.9	1.05	1.5	2.0				2.0		1.5	
24	1.1			2.5				1.9	1.9	1.4	
25	1.2	1.2	1.4	2.5				1.8	2.25	1.4	1.4
26	1.2	1.1		2.55				1.9	2.0		1.2
27	1.1	1.1	1.3	2.85				2.0	1.9	1.55	1.1
28	1.1	1.1	1.3	2.95	4.4			2.0	1.8		
29	1.1		1.4	3.2	4.6			2.1	1.8	1.1	1.5
30	1.4		1.5	2.9				2.9	1.6	1.3	1.45
31	1.4		1.5						1.7		

Daily discharge, in second-feet, of Roaring Fork at Glenwood Springs, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Sept.	Oct.	Nov.	Dec.
1	350	680	365	750	1,680				2,530	645	545
2	350	420	365	790	1,500				2,040	698	610
3	350	420	365	780	1,500				1,620	750	610
4	350	420	392	770	1,620				1,270	935	645
5	350	365	420	755	2,200	7,290			4,800	1,120	680
6	350	365	480	740	3,250	8,030			3,620	865	610
7	480	365	480	725	3,430				2,710	610	610
8	480	365	480	715	4,400				2,370	750	540
9	480	315	790	750	5,010				2,040	750	480
10	540	365	750	750	4,400				1,710	750	510
11	680	420	750	750	3,620				1,380	715	540
12	450	420	510	715	3,250				1,270	662	480
13	420	420	450	680	3,620				1,170	610	436
14	420	365	450	645	4,050	7,800			1,170	715	392
15	405	392	480	575	4,400			830	1,120	610	466
16	390	392	480	645	4,400			843	1,080	610	540
17	375	392	480	715	4,400		3,250	858	1,040	540	540
18	360	365	480	680	4,800			790	990	575	540
19	345	365	480	750	5,430			715	910	585	540
20	330	340	480	950	4,000			772	1,040	595	480
21	310	365	510	1,080	3,430			830	1,170	610	420
22	290	352	540	1,270	3,250			790	1,080	610	450
23	270	340	610	990	3,510			990	1,000	610	480
24	365	380	575	1,500	3,770			910	910	540	510
25	420	420	540	1,500	4,030			830	1,220	540	540
26	420	365	510	1,560	4,290			910	990	592	420
27	365	365	480	1,960	4,550			990	910	645	365
28	365	365	480	2,120	4,800			990	830	505	488
29	365		540	2,530	5,220			1,080	830	365	610
30	540		610	2,040	5,300			2,040	680	480	575
31	540		610		5,400				750		510

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge Jan. 1 to 6 estimated at 350 second-feet. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Roaring Fork at Glenwood Springs, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	680	270	403	24,800	C.
February	680	315	389	21,600	B.
March	790	365	514	31,600	B.
April	2,530	645	1,040	61,900	B.
May	5,430	1,500	3,820	235,000	C.
September 15-30	2,040	715	948	30,100	B.
October	4,800	680	1,490	91,600	C.
November	1,120	365	653	38,900	B.
December	680	365	521	32,000	C.
The period				568,000	

HUNTER CREEK AT ASPEN, COLO.

Location.—On the railroad bridge in Aspen, in sec. 7, T. 10 S., R. 84 W., about 500 feet above the mouth. No tributary enters within several miles of the mouth.

Records available.—February 17 to December 31, 1911.

Drainage area.—42 square miles (measured from topographic sheet).

Gage.—Vertical staff.

Channel.—Shifting after high water.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months, and discharge measurements are made to determine the flow.

Diversions.—During a portion of the time the Roaring Fork Light & Power Co. diverts water above the station. There is a court decree for a diversion of 15 second-feet above the station.

Accuracy.—Fair, for period covered.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Hunter Creek at Aspen, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 17	O. M. Wimmer	0.60	4.1	Sept. 25	O. M. Wimmer	0.62	9.2
Apr. 2	do	1.00	19.2	Dec. 26	do	.30	[a] 3.0
July 20	do	1.30	41.2				

[a] Discharge estimated. Ice conditions.

Daily gage height, in feet, of Hunter Creek at Aspen, Colo., for 1911.

[N. S. Ashlock, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.6			2.7			0.4			
2			1.0		2.8			.2		0.4	
3		.6			2.8						
4		.6			2.7			.3			
5		.6	1.1	2.5	2.9						0.6
6		.7		2.8	2.6						
7		.7	1.1	2.7	2.5	1.8	0.1				.5
8		.6		2.5	2.6	1.6		.1		.6	
9			.9		2.5			.1		.6	1.0
10		.7			2.1					.6	

Daily gage height, in feet, of Hunter Creek at Aspen, Colo., for 1911—Continued.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11				2.3	2.0	1.4				0.6	
12							0.3				0.5
13				2.0						.9	
14				1.9	2.3					.8	
15			0 8	2.0	2.2	1.6				.9	.5
16			.7	1.9		1.4	.3			.8	
17	0.6			2.2	2.1						.4
18	.6	0.7		2.3						.6	
19	.6			2.4	2.1		.9				
20	.7		1.1	2.1	2.1	1.3		0.7		.8	
21	.6	.7		1.7	2.3						
22	.6		1.2	2.0	2.3					.7	
23	.6	.8			2.3			.8		.7	.4
24	.6			2.0	2.1					.7	
25	.6			1.9			.8	.6			
26	.5			2.3	1.6		.7				.3
27				2.4	1.8					.7	.3
28	.6	.8		2.6			.9				
29											.2
30				2.3					0.5		
31		.8		2.6			.4		.4		

NOTE.—Gage heights Nov. 13 to Dec. 31 affected by ice.

Daily discharge, in second-feet, of Hunter Creek at Aspen, Colo., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		7	15	100	342	107		3.0			
2		7	19	150	372	110		1.0		3.0	
3		7	21	200	372	115					
4		7	23	250	342	112		2.0			
5		7	25	282	402	110					
6		9	25	372	312	108					
7		9	25	342	282	107	0.5				
8		7	20	282	312	76		.5		7.0	
9		8	15	262	282	68		.5		7.0	
10		9	15	242	173	60				7.0	
11		9	14	223	148	51				7.0	
12		9	13	186	173	57	2.0				
13		9	13	148	198	63					
14		9	12	127	223	69					
15		9	12	148	198	76					
16		9	9	127	186	51	2.0				
17	7	9	13	198	173	49					
18	7	9	17	223	173	47					
19	7	9	21	252	173	44	15				
20	9	9	25	173	173	41		9.0			
21	7	9	28	90	223						
22	7	10	32	148	223						
23	7	12	35	148	223			12			
24	7	12	40	148	173						
25	7	12	45	127	124		12	7.0			
26	5	12	50	223	76		9.0				3.0
27	6	12	55	252	107						
28	7	12	60	312	107		15				
29		12	65	268	107						
30		12	75	223	107				5.0		
31		12		312			3.0		3.0		

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge interpolated for days for which gage heights are missing from Feb. 17 to July 20.

Monthly discharge of Hunter Creek at Aspen, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
February, 12 days			6.92	164	C.
March	12	7	9.48	583	C.
April	75	9	27.9	1,660	C.
May	372	90	211	13,000	C.
June	402	76	216	12,900	C.
July, 20 days	115		76	3 010	C.

CASTLE CREEK NEAR ASPEN, COLO.

Location.—On the highway bridge 4 miles above Aspen, in sec. 35, T. 10 S., R. 85 W., in the Sopris National Forest. No tributary is between the station and the mouth of the creek except small gulches that carry spring run-off. Nearest tributary above, Conundrum Creek, enters about 6 miles upstream.

Records available.—February 16 to December 31, 1911.

Drainage area.—72 square miles (measured from topographic sheets).

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes some backwater at this station, and discharge measurements are made to determine the flow.

Diversions.—No water is diverted above the station; there is a court decree for 2 second-feet below the station.

Accuracy.—As the station has not yet been completely rated estimates of discharge can not be made. The base data should be reliable.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Castle Creek near Aspen, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 16	O. M. Wimmer	1.05	32.7	July 20	O. M. Wimmer	1.90	24.4
Apr. 3	.....do	1.25	45.7	Sept. 25	.....do	1.55	10.6
12	.....do	1.15	39.7	Dec. 27[a]	.....do	.85	40.4

[a] Ice conditions.

Daily gage height, in feet, of Castle Creek near Aspen, Colo., for 1911.

[S. C. Swearingen, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			1.15		3.05						
2				1.45	3.05						
3			1.25								
4										1.25	
5											
6				1.85		4.55					1.15
7			1.05								
8								1.65			
9		1.05		2.35							
10					3.45				1.35	1.35	

Daily gage height, in feet, of Castle Creek near Aspen, Colo., for 1911—Continued.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11			1.05		4.35						1.15
12			1.15				2.15				
13		1.15		2.05						1.15	
14							2.05				
15			1.05		4.35	2.45					
16	1.05			1.85	3.65					1.15	
17	1.05		1.15	2.05						1.15	1.15
18	1.05										1.15
19											
20	1.15	1.05		2.05	3.85	1.9					
21								1.55	1.25		
22			1.25	1.85						1.15	
23	1.05			1.85				1.65			
24		1.05			3.85						
25	1.05							1.55	1.25		
26			1.45						1.25		
27				2.05						1.15	.85
28											
29			1.45	2.35							1.05
30		1.15									
31				2.85							

NOTE.—Gage height Dec. 27 distorted by ice.

MAROON CREEK NEAR ASPEN, COLO.

Location.—In sec. 22, T. 10 S., R. 85 W., in the Sopris National Forest, just above the headgate of the Roaring Fork Light & Power Co., 5 miles above Aspen, Colo. Nearest tributary, Willow Creek, enters just below the station.

Records available.—January 1 to December 31, 1911.

Drainage area.—42 square miles (measured from topographic sheet).

Gage.—Vertical staff.

Channel.—Shifting after high water.

Discharge measurements.—Made by wading except during high water when they are made from a footbridge.

Winter flow.—Discharge measurements indicate that ice does not cause backwater at this station.

Diversions.—So far as known, no water is diverted above the station; the Roaring Fork Light & Power Co. diverts water just below.

Accuracy.—Estimates made are reliable, but snowslides upstream sometimes choke the channel and hold the water back.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Maroon Creek near Aspen, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 16	O. M. Wimmer	0.42	22.6	Sept 25	O. M. Wimmer	0.91	82.2
Apr. 12	do	.41	22.8	Dec 27	do	.80	71.5
July 20	do	1.70	257				

Daily gage height, in feet, of Maroon Creek near Aspen, Colo., for 1911.

[S. C. Swearingen, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.5	0.5							1.2			
2	.5	.4			0.7							0.7
3	.7	.4				1.9	2.1					
4	.6	.5			.8							
5	.6	.5	0.4	0.5		2.1						.7
6	.5	.5				2.2					0.8	
7	.5	.5		.4		2.1						
8	.5	.5			1.1			1.4			.9	
9	.5	.5	.4						1.0			.65
10	.6	.5	.4		1.2	2.2						
11	.6	.5	.4	.4						1.3		
12	.6	.4	.4	.4				1.4				
13	.6	.4			1.1	2.3	1.8			1.2		
14	.5	.4									.8	
15	.5	.4	.4	.4		2.3					.8	.8
16	.5	.4	.4		1.2		1.9					
17	.5	.4				2.2		1.3		1.2		
18	.5	.5		.4							.8	
19	.5	.4	.4					1.3				.6
20	.5	.4			1.4	2.2	1.7				.8	
21	.4	.5	.4			2.2						
22	.4	.4	.4	.6		2.2						
23	.5	.5	.4			2.2			1.0		.8	
24			.4	.6							.8	
25		.4			1.5				.9			
26	.4	.4	.3	.8				1.2				
27	.5	.4			1.5	2.0						.8
28	.5	.4								.9		.65
29	.5			.8				1.2				
30	.5		.4							.8		
31	.5				1.8		1.5			.8		

Daily discharge, in second-feet, of Maroon Creek near Aspen, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	32	32	22	25	60	273		192	134		69	56
2	32	22	22	27	56	281		190	130		69	56
3	56	22	22	28	63	290	350	187	125		69	56
4	44	32	22	30	69	320		184	121		69	56
5	44	32	22	32	81	350		181	116		69	56
6	32	32	22	27	92	385		179	112		69	56
7	32	32	22	22	104	350		176	108		76	54
8	32	32	22	22	116	362		173	103		83	52
9	32	32	22	22	125	373		173	99		80	50
10	44	32	22	22	134	385		173			75	53
11	44	32	22	22	128	397		173		153	72	56
12	44	22	22	22	122	408		173		144	70	59
13	44	22	22	22	116	420	265	169		134	69	62
14	32	22	22	22	122	420	275	165		134	69	65
15	32	22	22	22	128	420	280	161		134	69	69
16	32	22	22	22	134	402	290	157		134	69	62
17	32	22	22	22	144	385		153		134	69	56
18	32	32	22	22	154	385		153		130	69	50
19	32	22	22	27	164	385		153		126	69	44
20	32	22	22	33	173	385	240	150		121	69	48
21	22	32	22	38	177	385		147		116	69	53
22	22	22	22	44	182	385		145		111	69	58
23	32	32	22	44	186	385		142	99	106	69	63
24	28	27	22	44	191	368		140	91	101	69	68
25	26	22	18	56	195	352		137	83	96	68	72
26	22	22	14	69	195	336		134		91	66	70
27	32	22	16	69	195	320		134		87	64	69
28	32	22	18	69	212	325		134		83	62	50
29	32		20	69	230	330		134		76	60	50
30	32		22	65	247	335		134		69	58	50
31	32		24		265		195	134		69		50

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge for days for which gage heights are missing, except for parts of July, September, and October, interpolated by means of climatologic records and comparison with records of flow of other streams.

Monthly discharge of Maroon Creek near Aspen, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	56	22	33.8	2,080	B.
February	32	22	26.5	1,470	B.
March	24	14	21.3	1,310	B.
April	69	22	35.3	2,100	B.
May	265	56	147	9,040	C.
June	420	273	363	21,600	C.
July, 7 days			271	3,770	C.
August	192	134	159	9,780	C.
September, 12 days			110	2,620	B.
October 11-31	153	69	112	4,670	B.
November	83	58	69.2	4,120	B.
December	72	44	57.1	3,510	B.
The period				66,100	

SNOW MASS CREEK AT SNOW MASS, COLO.

Location.—On a private bridge at Stewart's ranch, in sec. 27, T. 8 S., R. 86 W., a half mile from Snow Mass, Colo. No tributaries between the station and the mouth of the creek.

Records available.—February 21 to December 31, 1911.

Drainage area.—89 square miles (measured from topographic sheet and Forest atlas).

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge measurements.—Made from the bridge during high water, and by wading at other times.

Winter flow.—Ice causes backwater during the winter months, and discharge measurements are made to determine the flow.

Diversions.—There are court decrees for diversion of 29 second-feet from the main stream above the station and 7 second-feet below. There are also decrees for diversions of 73 second-feet from tributaries entering above.

Accuracy.—Estimates of discharge are considered fair.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Snow Mass Creek at Snow Mass, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 21	O. M. Wimmer	0.32	40.5
Apr. 12	....do	.30	48.3
July 20	....do	1.40	303
Sept. 25	....do	.65	80.1

Daily gage height, in feet, of Snow Mass Creek at Snow Mass, Colo., for 1911.

[Geo. Hutchins, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			0.3	0.6	1.4		1.3	0.6		0.6	
2											
3									1.0		
4				.7							0.5
5			.3		1.85		1.1		1.4		
6										.6	
7							1.0				
8				.9	1.95						
9									1.0		
10			.3			1.6				.6	
11				.85							.5
12			.3		1.8						
13					2.7	1.5				.6	
14							.9		.7		
15		0.4		.8	2.4						
16							.9				
17			.1			1.1			1.7		
18		.4		.9				.5			.5
19					2.1						
20						1.4			.6	.5	
21	0.3	.4					.9				
22				.6			.9	.6			
23					2.6				.6		
24		.3	.2			1.5					
25				.95				.6			
26					2.0					.5	
27		.5								.5	.5
28		.3	.65			1.3	.7	.6			
29		.3		.6	1.7						
30		.4	.7								
31											

NOTE.—Gage heights throughout the month of December slightly affected by ice.

Daily discharge, in second-feet, of Snow Mass Creek at Snow Mass, Colo., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		50	45	90	305	416	270	90	144	90
2		50	45	97	353	412	255	89	162	90
3		50	45	104	402	408	240	88	180	90
4		50	45	110	451	404	225	87	242	90
5		50	45	122	500	400	210	86	305	90
6		50	45	133	518	396	195	85	274	90
7		50	45	144	535	392	180	84	243	90
8		50	45	155	552	388	177	83	212	90
9		50	45	150	533	384	174	82	180	90
10		50	45	146	514	380	171	81	166	90
11		50	45	141	495	367	167	80	152	90
12		50	45	138	475	354	163	79	138	90
13		50	41	135	1,020	340	159	78	124	90
14		50	37	132	923	308	155	77	110	88
15		58	32	130	825	275	155	76	215	86
16		58	27	138	778	242	155	75	320	84
17		58	22	147	732	210	155	74	425	82
18		58	24	155	686	242	155	73	314	79
19		58	26	138	640	274	155	78	202	76
20		58	28	122	718	305	155	82	90	73
21	40	58	30	106	797	314	155	86	90	73
22		54	31	90	876	322	155	90	90	73
23		50	32	116	955	331	148	90	90	73
24		45	33	142	830	340	141	90	90	73
25		54	50	168	705	323	134	90	90	73
26		64	67	148	580	306	126	90	90	73
27		73	84	128	528	288	188	90	90	73
28		45	100	108	476	270	110	90	90	73
29		45	105	90	425	270	106	108	90	73
30		58	110	162	420	270	100	126	90	73
31		52		234		270	95		90	

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Mar. 1 to 14 estimated at 50 second-feet. Discharge for days for which gage heights are missing interpolated by means of climatologic records and comparison with records of flow of other streams.

Monthly discharge of Snow Mass Creek at Snow Mass, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
February			[a] 40	2,220	C.
March	73	45	53.1	3,260	C.
April	110	22	47.3	2,810	B.
May	234	90	133	8,180	B.
June	1,020	305	618	36,800	C.
July	416	210	329	20,200	C.
August	270	95	163	10,000	B.
September	126	73	85.9	5,110	B.
October	425	90	167	10,300	B.
November	90	73	82.3	4,900	B.
December			[a] 60	3,690	D.
The period				107,000	

[a] Estimated from discharge measurements.

FRYING PAN CREEK AT NORRIE, COLO.

Location.—At the highway bridge in Norrie, in sec. 28, T. 8 S., R. 83 W., in the Sopris National Forest, 1 mile above the entrance of the North Fork.

Records available.—February 18 to December 31, 1911.

Drainage area.—92 square miles (measured from topographic sheet).

Gage.—Vertical staff.

Channel.—Slightly shifting after high water.

Discharge measurements.—Made from the bridge.

Winter flow.—Ice probably causes backwater during the winter months.

Diversions.—No water is diverted from this creek either above or below the station.

Accuracy.—Records at this station are considered reliable.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Frying Pan Creek at Norrie, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 18	O. M. Wimmer	2.40	29.1
Apr. 11	do	2.70	45.3
July 21	do	3.50	179
Sept. 26	do	2.85	52.8

Daily gage height, in feet, of Frying Pan Creek at Norrie, Colo., for 1911.

[B. I. Beaty, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.4	2.8	3.3	5.4	4.2	3.4	2.9		2.6	2.9
2		2.45	2.8	3.15	5.45	4.5	3.2	2.9		2.7	2.9
3		2.45	3.1	3.15	5.45					2.5	2.9
4		2.4	3.15		5.3	4.55	3.2	3.0	2.9	2.55	
5		2.45	3.1	3.9	5.4	4.4	3.1	2.9		2.7	2.9
6		2.4	3.0	4.05	5.65	4.75	3.1	2.9	3.3	2.7	2.9
7		2.4	3.0	4.6	5.45	4.4	3.0	2.8	3.1	2.9	2.9
8		2.4	3.0	4.75	5.4	4.2		2.8	3.1	2.7	
9		2.4	2.9	4.92	5.5	4.25		2.8	3.0	2.8	2.9
10		2.4	2.9	4.55	5.3	4.0	3.1	2.8	3.0	2.7	
11		2.4	2.7	4.15	5.4		3.5	2.8	2.9	2.7	2.9
12		2.4	2.8	4.15	5.35	3.9	3.3	2.7	2.9		
13		2.5	2.8	4.3		3.8	3.1	2.9	2.9		2.9
14		2.6	2.8	4.4	5.2	3.8	3.0	2.8	2.8		2.9
15		2.6	2.8	4.55	6.05	3.7			2.8		
16		2.75	2.8	4.45	5.4		3.0		2.6	3.1	3.0
17		2.6	2.8	4.7	5.2	3.95	3.0		2.8	3.0	
18	2.4	2.7	2.9	5.3	5.2	3.8			2.8	2.8	
19	2.42	2.7	3.0	5.0	5.25	3.8	2.95			2.8	2.9
20	2.41	2.7	3.1	4.3	5.2		3.1	2.9	2.7		

Daily gage height, in feet, of Frying Pan Creek at Norrie, Colo., for 1911—Continued.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	2.4	2.8	3.2	4.05	5.2	3.6	3.4	2.9	2.7	2.7	2.85
22	2.4	2.8	3.38	4.05	5.3	....	3.2	2.9	2.8	2.7	....
23	2.4	2.7	3.45	4.1	5.0	....	3.3	3.0	2.7	2.7	2.8
24	2.4	2.8	3.3	4.3	....	3.9	3.2	2.9	2.7	2.75	2.9
25	2.4	2.8	3.25	5.0	....	3.7	3.2	2.85	2.65	2.8	....
26	2.4	2.8	3.4	4.8	....	3.9	3.1	2.8	2.7	....	....
27	....	2.7	3.6	4.65	....	....	3.0	2.8	....	2.8	2.8
28	....	2.8	3.8	4.9	4.3	....	3.0	....	2.7	2.9	....
29	....	2.8	3.85	5.1	4.3	3.5	3.0	2.8	2.7	....	2.8
30	....	2.8	3.6	5.0	4.2	....	....	3.0	....	2.9	....
31	....	2.8	....	5.0	....	....	2.9	....	....	....	....

NOTE.—Ice affected the gage heights from Feb. 18 to Mar. 28 and Nov. 9 to Dec. 31.

Daily discharge, in second-feet, of Frying Pan Creek at Norrie, Colo., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	25	26	52	130	855	385	150	62	110	37	62
2	25	28	52	101	877	490	110	62	90	44	62
3	25	28	91	101	877	499	110	68	75	31	62
4	25	26	101	193	810	508	110	75	62	34	62
5	25	28	91	285	855	455	91	62	96	44	62
6	25	26	75	332	967	580	91	62	130	44	62
7	25	26	75	525	877	455	75	52	91	62	62
8	25	26	75	580	855	385	80	52	91	44	62
9	25	26	62	648	900	402	85	52	75	52	62
10	25	26	62	508	810	315	91	52	75	44	62
11	25	26	44	368	855	330	175	52	62	44	62
12	25	26	52	368	832	285	130	44	62	45	62
13	25	31	52	420	798	255	91	62	62	46	50
14	25	37	52	455	765	255	75	52	52	47	50
15	25	37	52	508	1,150	225	75	54	52	48	40
16	25	44	52	472	855	262	75	56	37	49	40
17	25	40	52	560	765	300	75	58	52	51	40
18	26	44	62	810	765	255	72	60	52	52	40
19	27	44	75	680	788	255	68	61	48	52	40
20	26	44	91	420	765	228	91	62	44	48	40
21	26	52	110	332	765	200	150	62	44	44	35
22	26	52	146	332	810	228	110	62	52	44	35
23	26	44	162	350	680	256	130	75	44	44	35
24	26	52	130	420	628	285	110	62	44	48	35
25	26	52	120	680	576	225	110	57	40	52	35
26	26	52	150	600	524	285	91	52	44	52	35
27	26	44	200	542	472	249	75	52	44	52	35
28	26	52	255	640	420	212	75	52	44	62	35
29	....	52	270	720	420	175	75	52	44	62	35
30	....	52	200	680	385	166	68	75	41	62	35
31	....	52	....	680	....	158	62	....	39	....	35

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Feb. 1 to 17 estimated at 25 second-feet. Discharge interpolated for days for which gage heights are missing and for November and December by comparison with records of flow of other streams and from climatologic data.

Monthly discharge of Frying Pan Creek at Norrie, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
February	27	25	25.4	1,410	C.
March	52	26	38.5	2,370	B.
April	270	44	102	6,070	B.
May	810	101	466	28,700	B.
June	1,150	385	760	45,200	C.
July	508	158	308	18,900	B.
August	175	62	96.0	5,900	B.
September	75	44	58.7	3,490	B.
October	130	37	60.9	3,740	B.
November	62	31	48.0	2,860	C.
December	62	35	47.4	2,910	C.
The period	....	....	....	122,000	

[a] Estimated.

FRYING PAN CREEK AT THOMASVILLE, COLO.

Location.—At a private bridge in sec. 12, T. 8 S., R. 84 W., in the Sopris National Forest, three-fourths of a mile below Thomasville. Nearest tributary, Jakeman Creek, enters 100 yards above.

Records available.—January 2 to December 31, 1911.

Drainage area.—190 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge measurements.—Made from bridge during high water, and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months, and discharge measurements are made to determine the flow.

Diversions.—As there are no court decrees for diversion of water above the station, it is probable that the records represent the natural run-off from the drainage basin.

Accuracy.—Conditions are favorable for accurate results, and the results are reliable.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Frying Pan Creek at Thomasville, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 2[a]	G. H. Russell	0.65	15.8	June 6	O. M. Wimmer	3.20	1,240
Feb. 18	O. M. Wimmer	.50	32.7	July 21	.....do	1.70	345
Apr. 11	.....do	.95	102	Sept. 26	.....do	.90	119

[a] Ice conditions.

Daily gage height, in feet, of Frying Pan Creek at Thomasville, Colo., for 1911.

[W. P. Huffman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	0.6	0.6	0.9	2.1	......	2.1	1.4	1.1	1.5	0.6	1.0
2	0.6	.6	.6	1.2	1.5	......	2.3	1.4	1.1	1.4	.6	1.0
3	.8	.6	.6	1.1	1.8	......	2.4	1.3	1.1	1.3	.6	1.0
4	.7	.6	.5	1.2	1.9	......	2.4	1.3	1.2	1.2	.6	1.0
5	.6	.6	.5	1.2	2.1	......	2.5	1.2	1.1	1.4	.6	.9
6	.6	.6	.5	.9	2.6	3.15	2.4	1.2	1.0	1.6	.6	.8
7	.6	.6	.5	1.0	2.5	3.0	2.3	1.2	1.0	1.5	.6	.8
8	.6	.7	.5	1.0	2.9	3.0	2.2	1.2	.9	1.4	.7	.8
9	.6	.8	.5	1.0	3.5	3.0	2.2	1.15	.9	1.3	.8	.8
10	.6	1.2	.6	1.0	3.0	3.1	2.0	1.2	.9	1.3	.8	.8
11	.6	.6	.6	1.0	2.7	3.0	2.0	1.2	.8	1.2	.7	.8
12	.6	.6	.6	.9	2.6	2.8	1.9	1.4	.8	1.2	.6	.7
13	.6	.6	.6	.9	2.7	3.0	1.8	1.3	.8	1.2	.8	.7
14	.6	.6	.7	.9	2.8	2.7	1.8	1.2	1.0	1.1	.8	1.3
15	.6	.6	.7	......	2.8	4.0	1.7	1.2	1.1	1.1	.8	1.5
16	.6	.6	.7	.4	2.9	2.9	1.7	1.2	.9	1.0	.8	.6
17	.6	.6	.7	.7	2.9	2.8	2.0	1.2	.9	1.0	.8	.6
18	.6	.6	.65	.9	2.9	2.7	1.8	1.2	.8	.9	.8	.6
19	.6	.6	.65	.9	......	2.7	1.8	1.2	.8	.8	.8	.6
20	.6	.6	.7	1.2	......	2.9	1.7	1.2	1.1	.7	.8	.6
21	.6	.6	.7	1.5	......	2.6	1.6	1.4	1.0	.7	.8	.6
22	.7	.6	.7	1.7	......	2.6	2.3	1.4	1.0	.9	.8	.6
23	1.2	.6	.7	1.8	......	2.6	1.9	1.4	1.0	.8	1.0	.6
24	1.2	.6	.7	1.6	......	2.5	1.7	1.4	.9	.8	1.0	.6
25	.6	.6	.7	1.8	......	2.5	2.0	1.3	.9	.8	1.0	.6
26	.6	.6	.7	1.6	......	2.3	1.9	1.3	1.0	.8	1.0	.6
27	.6	.6	.8	2.0	......	2.2	1.7	1.2	1.0	1.0	1.0	.6
28	.6	.6	.7	2.2	......	2.1	1.6	1.1	1.0	1.2	1.2	.7
29	.6	......	.7	2.1	......	2.1	1.6	1.1	1.0	1.0	1.0	.6
30	......	......	.8	......	......	2.1	1.6	1.1	1.2	.8	1.0	.6
31	.6	......	.8	......	......	......	1.5	1.1	......	.7	......	.6

NOTE.—Gage heights Jan. 1 to Apr. 1, Nov. 28, and Dec. 14 and 15 affected by ice. Gage washed out by flood May 19; reset to same datum June 6.

Daily discharge, in second-feet, of Frying Pan Creek at Thomasville, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	16	....	33	100	530	1,500	530	230	145	265	45	120
2	16	....	33	170	265	1,500	640	230	145	230	45	120
3	16	....	33	145	385	1,500	700	200	145	200	45	120
4	16	....	33	170	430	1,500	700	200	170	170	45	120
5	16	....	33	170	530	1,500	760	170	145	230	45	100
6	16	....	33	100	820	1,200	700	170	120	300	45	80
7	17	....	33	120	760	1,100	640	170	120	265	45	80
8	18	....	33	120	1,030	1,100	580	170	100	230	60	80
9	19	....	33	120	1,470	1,100	580	158	100	200	80	80
10	20	....	45	120	1,100	1,170	480	170	100	200	80	80
11	20	....	45	120	890	1,100	480	170	80	170	60	80
12	20	....	45	100	820	960	430	230	80	170	45	60
13	20	....	45	100	890	1,100	385	200	80	170	80	60
14	20	....	60	100	960	890	385	170	120	145	80	60
15	20	....	60	62	960	1,870	340	170	145	145	80	45
16	20	....	60	25	1,030	1,030	340	170	100	120	80	45
17	20	....	60	60	1,030	960	480	170	100	120	80	45
18	20	33	52	100	1,030	890	385	170	80	100	80	45
19	20	....	52	100	1,000	890	385	170	80	80	80	45
20	20	....	60	170	900	1,030	340	170	145	60	80	45
21	19	....	60	265	800	820	300	230	120	60	80	45
22	18	....	60	340	800	820	640	230	120	100	80	45
23	18	....	60	385	800	820	430	230	120	80	120	45
24	19	....	60	300	800	760	340	230	100	80	120	45
25	20	....	60	385	900	760	480	200	100	80	120	45
26	21	....	60	300	900	640	430	200	120	80	120	45
27	23	....	80	480	900	580	340	170	120	120	120	45
28	25	....	60	580	900	530	300	145	120	170	120	60
29	26	....	60	530	1,000	530	300	145	120	120	120	45
30	28	....	80	530	1,000	530	300	145	170	80	120	45
31	30	....	80	....	1,000	....	265	145	....	60	....	45

Note.—Daily discharge determined from a well-defined rating curve. Discharge Jan. 1 to 31, Mar. 1 to Apr. 1, and May 19 to June 5 estimated from current meter measurements, climatologic data, and by comparison with records at other stations on the stream.

Monthly discharge of Frying Pan Creek at Thomasville, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	30	16	19.9	1,220	C.
February	....	....	[a]33.0	1,830	C.
March	80	33	51.6	3,170	B.
April	580	25	212	12,600	B.
May	1,470	265	859	52,800	D.
June	1,870	530	1,020	60,700	D.
July	760	265	464	28,500	B.
August	230	145	185	11,400	B.
September	170	80	117	6,960	B.
October	300	60	148	9,100	B.
November	120	45	90.0	4,760	B.
December	120	45	65.2	4,010	B.
The year	1,870	16	271	197,000	

[a] Estimated from discharge measurement.

NORTH FORK OF FRYING PAN CREEK NEAR NORRIE, COLO.

Location.—On a highway bridge in sec. 21, T. 8 S., R. 83 W., in the Sopris National Forest, about 1 mile from Norrie. No tributaries between the station and the mouth of the creek.

Records available.—February 18 to December 31, 1911.

Drainage area.—42 square miles (measured from topographic sheet).

Gage.—Vertical staff.

Channel.—Permanent.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Ice probably causes backwater during the winter months.

Diversions.—No water is diverted above the station.

Accuracy.—Owing to the scattered gage heights the records can not be considered better than fair or possibly good.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of North Fork of Frying Pan Creek near Norrie, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 18[a]	O. M. Wimmer	0.15	7.6
Apr. 11	do	.50	18.4
July 21	do	.80	43.0
Sept. 26	do	.40	11.3

[a] Affected by ice.

Daily gage height, in feet, of North Fork of Frying Pan Creek near Norrie, Colo., for 1911.

[B. I. Beaty, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.17	0.50	1.30	2.25	1.20		0.35			
2		.15	.50		2.30					0.40	
3		.17	.75	.95	2.30		0.60	.35	0.70		
4		.17					.55	.40			
5		.15	.70	1.60	2.30				.90		
6				1.70		1.70	.50	.30			
7		.15		1.75	2.40					.40	
8			.70	1.90		1.30		.20	.90		
9		.15									0.25
10		.17	.60				.70	.20		.45	
11			.50	1.50			.50		.70		
12		.17		1.50			.70				
13			.50	1.60		.95	.60				.25
14		.20	.55	1.80		.90			.60		
15		.22	.55	1.90	3.60				.50		
16		.22			2.10		.50				.25
17		.23	.45							.60	
18	0.15	.23		2.00	2.00						
19	.17		.50			.90	.50		.50		
20	.16	.24		1.70	2.00			.40			.20
21	.10	.24	.60			.90			.50		
22	.15	.26	.75			1.00	.60	.30			
23	.15	.28		1.55	1.80					.30	.20
24	.15	.30	.90	1.75	1.60		.50				
25	.17	.30		1.85					.50		
26			1.10	2.00	1.40		.40	.40			
27		.30	1.35	1.85			.40				.30
28	.17		1.50			.80	.40	.50	.40	.30	
29		.35		1.95	1.30	.80	.50	.50	.40		.30
30					1.30						
31		.37		2.15		.70					

NOTE.—Ice probably affected gage heights Feb. 18 to Mar. 18.

Daily discharge, in second-feet, of North Fork of Frying Pan Creek near Norrie, Colo., for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		8	19	113	345	96	32	11	26	13	9
2		8	19	87	360	118	29	11	30	13	9
3		8	39	61	360	140	26	11	34	13	9
4		8	36	121	360	162	22	13	44	13	8
5		8	34	180	360	184	20	11	55	13	8
6		8	34	205	375	205	19	9	55	13	8
7		8	34	218	390	159	22	8	55	13	8
8		8	34	255	400	113	26	7	55	14	8
9		8	30	222	400	102	30	7	48	15	8
10		8	26	188	400	92	34	7	41	16	8
11		8	19	155	400	82	19	7	34	16	8
12		8	19	155	400	72	34	8	32	18	8
13		8	19	180	400	61	26	8	29	19	8
14		8	22	230	400	55	24	9	26	20	8
15		8	22	255	765	55	22	9	19	22	8
16		8	19	263	305	55	19	10	19	24	8
17		8	16	272	292	55	19	10	19	26	8
18	7.6	8	18	280	280	55	19	11	19	24	8
19		8	19	242	280	55	19	12	19	21	7
20		8	22	205	280	55	22	13	19	18	7
21		8	26	192	264	55	24	11	19	15	7
22		8	39	180	247	67	26	9	19	12	7
23		9	47	168	230	64	22	10	19	9	7
24		9	55	218	180	60	19	11	19	9	7
25		9	68	242	156	56	16	12	19	9	7
26		9	81	280	133	52	13	13	17	9	7
27		9	123	242	126	48	13	16	15	9	7
28		10	155	255	120	44	13	19	13	9	7
29		11	141	268	113	44	19	19	13	9	7
30		12	127	293	113	39	16	22	13	9	7
31		12		318		34	14		13		7

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Mar. 1 to 19 estimated at 8 second-feet; June 8 to 14, 400 second-feet. Discharge for days for which gage heights are missing interpolated by comparison with records at other stations and from climatologic data.

Monthly discharge of North Fork of Frying Pan Creek near Norrie, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 5.0	307	D.
February			[a] 7.6	422	D.
March	12		8.58	528	C.
April	155	16	45.4	2,700	A.
May	318	61	211	13,000	B.
June	765	113	308	18,300	C.
July	205	34	81.7	5,020	B.
August	34	13	21.9	1,350	B.
September	22	7	11.1	660	B.
October	55	13	27.6	1,700	B.
November	26	9	14.8	881	C.
December	9	7	7.7	473	C.
The year	765		62.5	45,300	

[a] Estimated.

CRYSTAL RIVER AT MARBLE, COLO.

Location.—Near the electric railway bridge of the Colorado Yule Marble Co., in sec. 26, T. 11 S., R. 88 W., half a mile west of Marble. Nearest tributary, Carbonate Creek, enters at Marble.

Records available.—November 1, 1910, to December 31, 1911.

Drainage area.—77 square miles (measured from Forest atlas).

Gage.—A vertical hook gage graduated to hundredths of a foot.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading during 1911.

Winter flow.—Gage heights at this station little, if any, affected by ice.

Diversions.—There are no court decrees for diversions above the station but for 114 second-feet below Marble.

Accuracy.—As the station has not yet been completely rated estimates of discharge can not be made.

Cooperation.—The field data are furnished through the courtesy of the Colorado-Yule Marble Co.

Discharge measurements of Crystal River at Marble, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 6	Russell and Wimmer	1.94	25.5
Mar. 21	Knouse and Lyon	2.01	36.0
27	do	1.94	29.0
Apr. 1	H. V. Knouse	2.23	56.2

Daily gage height, in feet, of Crystal River at Marble, Colo., for 1911.

[H. V. Knouse, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.92	1.97	1.84	2.25	2.72	4.60	4.42	3.10	2.50	3.88	2.38	2.16
2	1.88	1.97	1.84	2.28	2.62	4.70	4.65	3.12	2.53	3.42	2.34	2.14
3	1.93	1.94	1.84	2.34	2.62	4.86	5.22	3.11	2.52	3.24	2.32	2.06
4	1.93	1.92	1.84	2.41	2.78	4.92	5.18	3.15	2.47	3.01	2.31	2.14
5	1.92	1.89	1.91	2.31	3.12	5.24	4.92	3.18	......	5.01	2.32	2.12
6	1.92	1.90	1.90	2.26	3.36	5.34	5.28	3.07	......	4.02	2.31	2.11
7	1.92	1.90	1.86	2.26	3.50	5.40	4.78	2.96	......	3.57	2.30	2.10
8	1.91	1.87	1.85	2.20	3.70	5.44	4.66	3.04	......	3.52	2.30	2.11
9	1.95	1.86	1.92	2.21	3.72	5.52	4.39	3.06	2.59	3.30	2.28	2.08
10	1.92	1.84	1.97	2.21	3.74	5.27	4.37	3.21	2.54	3.12	2.32	2.08
11	1.86	1.88	1.98	2.19	3.39	5.51	4.76	3.12	2.55	3.00	2.22	2.09
12	1.94	1.87	1.90	2.16	3.31	5.53	4.10	2.98	2.39	2.90	2.20	2.06
13	1.97	1.92	1.90	2.14	3.40	5.66	4.12	2.96	2.58	2.80	2.33	2.07
14	1.94	1.86	1.84	2.10	3.39	5.51	3.96	2.88	2.56	2.76	2.32	2.01
15	1.94	1.88	1.89	2.12	3.50	5.52	4.07	2.89	2.54	2.66	2.27	2.08
16	2.00	1.90	1.94	2.04	3.55	5.42	4.05	2.85	2.44	2.66	2.26	2.06
17	1.95	1.89	1.96	2.18	3.75	5.04	4.00	2.88	2.41	2.62	2.24	2.03
18	1.95	1.85	1.94	2.22	3.90	5.25	3.98	2.82	2.38	2.59	2.22	2.06
19	1.94	1.90	1.89	2.29	3.90	5.38	3.74	2.78	2.34	2.54	2.24	2.03
20	1.92	1.84	2.00	2.46	3.70	5.34	3.65	2.82	2.45	2.48	2.26	2.03
21	1.93	1.82	1.99	2.55	3.45	5.84	3.81	2.94	2.40	2.48	2.21	2.00
22	1.91	1.80	2.04	2.60	3.36	5.45	4.50	2.82	2.44	......	2.22	2.02
23	1.98	2.01	2.04	2.68	3.74	5.35	3.80	2.86	2.39	2.50	2.20	2.04
24	1.94	1.86	2.06	2.69	4.02	5.25	3.90	2.80	2.43	2.46	2.20	1.99
25	1.96	1.85	2.04	2.67	4.08	5.00	3.77	2.72	2.44	2.41	2.19	1.98
26	1.94	1.86	1.91	2.80	4.13	4.85	3.68	2.67	2.56	2.40	2.20	2.00
27	1.94	1.86	1.94	2.94	4.03	4.85	3.58	2.59	2.67	2.44	2.20	1.94
28	1.93	1.84	1.96	2.96	4.02	4.88	3.48	2.56	2.86	2.42	2.07	2.00
29	1.98	......	2.00	3.01	4.26	4.90	3.40	2.54	2.75	2.43	2.10	1.98
30	1.98	......	2.08	2.82	4.42	4.46	3.37	2.52	3.82	2.39	2.16	1.98
31	1.98	......	2.16	......	4.55	......	3.31	2.53	......	2.35	......	1.87

NOTE.—Gage heights during January, February, November, and December very slightly affected by ice.

Daily discharge, in second-feet, of Crystal River at Marble, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	29	32	25	61	140	975	867	232	100	565	79	51
2	27	32	25	65	122	1,040	1,000	239	105	348	73	48
3	30	30	25	73	122	1,130	1,350	235	104	279	70	40
4	30	29	25	84	152	1,170	1,320	248	95	208	68	48
5	29	28	29	68	239	1,360	1,170	258	99	1,220	70	46
6	29	28	28	62	324	1,430	1,390	224	103	636	68	45
7	29	28	26	62	380	1,460	1,080	195	107	412	67	44
8	29	26	26	55	475	1,490	1,010	216	112	389	67	45
9	31	26	29	56	485	1,540	849	221	116	300	65	42
10	29	25	32	56	495	1,380	837	268	107	239	70	42
11	26	27	33	54	336	1,540	1,070	239	109	205	57	43
12	30	26	28	51	304	1,550	680	200	80	180	55	40
13	32	29	28	48	340	1,630	691	195	114	156	72	41
14	30	26	25	44	336	1,540	605	175	111	148	70	35
15	30	27	28	46	380	1,540	664	178	107	129	63	42
16	34	28	30	38	402	1,480	652	168	89	129	62	40
17	31	28	32	53	500	1,240	625	175	84	122	60	37
18	31	26	30	57	575	1,370	615	161	79	116	57	40
19	30	28	28	66	575	1,450	495	152	73	107	60	37
20	29	25	34	93	475	1,430	450	161	91	96	62	37
21	30	24	33	109	360	1,750	530	190	82	96	56	34
22	29	23	38	118	324	1,500	915	161	89	98	57	36
23	33	35	38	132	495	1,430	525	170	80	100	55	38
24	30	26	40	134	636	1,370	575	156	87	93	55	28
25	32	26	38	131	669	1,220	510	140	89	84	54	33
26	30	26	29	156	696	1,120	465	131	111	82	55	34
27	30	26	30	190	642	1,120	416	116	131	89	55	30
28	30	25	32	195	636	1,140	372	111	170	86	41	34
29	33	....	34	208	771	1,160	340	107	146	87	44	33
30	33	....	42	161	867	891	328	104	535	80	51	33
31	33	....	51	....	945	....	304	105	....	74	....	26

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge interpolated for days when gage was not read.

Monthly discharge of Crystal River at Marble, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	34	26	30.3	1,860	B.
February	35	23	27.3	1,520	B.
March	51	25	31.3	1,920	B.
April	208	38	90.9	5,410	B.
May	945	122	458	28,200	B.
June	1,750	891	1,350	80,300	B.
July	1,390	304	732	45,000	B.
August	268	104	182	11,200	B.
September	535	73	117	6,960	B.
October	1,220	74	224	13,800	B.
November	79	41	61.3	3,650	B.
December	51	26	38.8	2,390	B.
The year	1,750	23	279	202,000	

ELK RIVER BASIN.

WEST ELK CREEK NEAR NEW CASTLE, COLO.

Location.—At the West Elk ranger station on the southern edge of White River National Forest, in sec. 29, T. 4 S., R. 91 W., 11 miles northwest of New Castle. Nearest tributary, Cherry Creek, enters a short distance above.

Records available.—January 20, 1911, to June 29, 1911, when it was discontinued.

Drainage area.—28 square miles (measured from Hayden's atlas).

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading.

Winter flow.—Effect of ice at this station is probably not severe.

Diversions.—So far as known there are no diversions above the station but there are court decrees for 24 second-feet diversion below.

Accuracy.—As the station has not been completely rated no estimates of discharge can be made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of West Elk Creek near New Castle, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 20	O. M. Wimmer	1.00	0.9
Feb. 23	do	1.05	1.2
Dec. 19[a]	H. B. Waha	....	1.0

[a] Ice conditions. Discharge estimated.

Daily gage height, in feet, of West Elk Creek near New Castle, Colo., for 1911.

[Ray L. Allen, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	......	1.01	1.03	......	1.28	0.98	16	......	0.98	1.08	1.18	1.30	.95
2	......	1.00	1.00	1.15	1.30	1.00	17	......	1.00	1.01	1.25	1.25	.95
3	......	1.08	1.02	1.20	1.25	.95	18	......	.98	1.00	1.20	1.18	......
4	......	1.00	1.02	1.18	1.25	.95	19	......	.98	1.10	1.18	1.20	......
5	......	1.05	1.01	1.15	1.42	.92	20	1.00	1.00	1.15	1.15	1.17	.90
6	......	1.00	1.05	1.15	1.40	.95	21	.95	1.00	1.18	......	1.15	.98
7	......	1.02	......	1.12	1.48	.95	22	.95	.98	1.18	1.20	1.10	......
8	......	1.00	1.17	1.10	1.60	1.00	23	.95	1.05	1.15	1.28	1.08	......
9	......	1.02	1.10	1.15	1.55	.92	24	.85	1.02	1.18	1.15	1.05	......
10	......	1.03	1.15	1.18	1.48	.92	25	......	.98	1.08	1.25	1.00	......
11	......	1.00	1.20	1.15	1.38	.95	26	.97	1.00	1.00	1.25	1.00	......
12	......	1.00	1.05	1.10	1.50	.95	27	.95	1.02	1.08	1.27	1.00	.95
13	......	1.00	1.01	1.12	1.40	......	28	.92	1.05	.98	1.30	1.00	.92
14	......	1.00	1.10	1.15	1.42	.98	29	......	......	1.10	1.20	1.01	.90
15	......	1.02	1.15	1.10	1.32	.95	30	1.05	......	1.21	1.25	1.00	......
							31	1.00	......	1.20	......	1.00	......

NOTE.—Gage heights Jan. 20 to Mar. 25 affected by ice.

MIDDLE ELK CREEK NEAR NEW CASTLE, COLO.

Location.—Opposite the mouth of West Elk Creek, in sec. 22, T. 5 S., R. 91 W., 10 miles above the entrance of East Elk Creek, a stream so small that it carries very little water except possibly during the spring.

Records available.—January 19, 1911, to December 31, 1911.

Drainage area.—122 square miles, including the area drained by West Elk Creek (measured from Forest atlas).

Gage.—Vertical staff. The gage was originally placed 300 yards farther downstream, but was moved to its present position September 23, 1911; relation between the datums of the two gages not determined.

Channel.—Somewhat shifting.

Discharge measurements.—Made from a near-by bridge during high water, and by wading below the mouth of West Elk Creek at ordinary stages.

Winter flow.—Gage heights at this station during the winter months little affected by ice.

Diversions.—There are court decrees for the diversion of 42 second-feet above the station and 35 second-feet from the main stream below.

Accuracy.—The channel at the original site was so unstable that the discharge could not be computed. The rating for the present site has not been completed.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Middle Elk Creek near New Castle, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 19	O. M. Wimmer	0.20	14.5	July 17	O. M. Wimmer	0.16	76.7
Feb. 23	do	.35	14.3	Sept. 22	do	− .34	22.2
Mar. 31	do	.30	15.6	Oct. 6[a]	do	1.58	57.2
June 7	do	1.82	344	Dec. 19[a]	H. B. Waha	1.10	21.2

[a] Discharge measurements taken at the new station established 300 yards upstream from the original station.

Daily gage height, in feet, of Middle Elk Creek near New Castle, Colo., for 1911.

[Ray L. Allen, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						2.73			−0.22		1.38	
2												
3												
4					1.40							1.20
5							0.51					
6										1.58		
7						1.82						
8			0.35	0.40								
9												
10											1.30	
11		.35			2.47							
12				.45			.24	−0.14				
13			.35									
14								− .19				
15				.42							1.22	
16						1.35						
17					2.75		.16					
18		.35	.30									
19	0.20											1.10
20						1.10				1.35		1.10
21												
22									− .34			
23		.35										
24	.17			.70	2.90		.16					
25		.25	.32					− .24			1.20	
26						.45						
27												
28		.34					.01			1.40		
29				1.45							1.22	
30												
31	.45		.30				− .04					

NOTE.—Gage heights Jan. 1 to Sept. 22 read on the original gage; gage heights Sept. 23 to Dec. 31 read on a gage established 300 yards upstream from the original gage and referred to a new datum.

EAST ELK CREEK NEAR NEW CASTLE, COLO.

Location.—At the highway bridge on line between secs. 24 and 25, T. 5 S., R. 91 W., 2½ miles northwest of New Castle, Colo. No tributaries between the station and the mouth.

Records available.—January 19, 1911, to December 31, 1911.

Drainage area.—60 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge measurements.—Made from the bridge during high water and by wading during ordinary stages.

Winter flow.—Little backwater from ice at this station during the winter.

Diversions.—There are court decrees for diversion of 43 second-feet from East Elk Creek, chiefly above the station.

Accuracy.—Estimates of discharge which have been made only for the days for which gage heights are available should be reliable.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of East Elk Creek near New Castle, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 19	O. M. Wimmer	0.60	8.2	July 17	O. M. Wimmer	0.90	25.1
Feb. 23	do	.75	12.9	Sept. 23	do	.15	3.4
Mar. 31	do	.70	12.9	Oct. 6	do	1.10	36.3
June 7	do	2.70	356	Dec. 19	H. B. Waha	.70	11.5

Daily gage height, in feet, of East Elk Creek near New Castle, Colo., for 1911.

[Ray L. Allen, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						2.30			0.40		0.98	
2												
3												
4					1.05							0.70
5							1.50					
6										1.10		
7						2.70						
8			0.65	0.85								
9												
10											.85	
11		0.60			1.80							
12				.75			.40	0.00		.95		
13			.62									
14								.00				
15				.68							.80	
16						2.70						
17					1.80		.90					
18		.40	.65									
19	0.60											.70
20						2.40				.80		
21												
22									.32			
23	.75	.75							.15			
24	.75			1.10	2.10		.92					
25		.68	.59					.45			.75	
26						1.90						
27												
28		.60					.88			.98		
29				1.38					.35		.78	
30												
31	.67		.70				.70					

Daily discharge, in second-feet, of East Elk Creek near New Castle, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						245			6.0		29	
2												
3												
4					34							12
5							79					
6										3.8		
7						365						
8			10	20								
9												
10											20	
11		9.0			130							
12				14			6.0	2.0		26		
13			10									
14								2.0				
15				11							17	
16						365						
17					130		23					
18		6.0	10									
19	9.0											12
20						275				17		
21												
22									5.2			
23	14	14							3.5			
24	14			38	195		24					
25		11	9.0					6.5			14	
26						150						
27												
28		9.0					22			29		
29				64					5.5		16	
30												
31	11		12				12					

DIVIDE CREEK BASIN.

WEST DIVIDE CREEK AT BEARD'S RANCH, NEAR RAVEN, COLO.

Location.—At Beard's ranch, about sec. 31, T. 7 S., R. 91 W., about 4 miles south of Raven, Colo.

Records available.—July 27, 1909, to September 20, 1909, at a point 1 mile above the present site; April 28, 1910, to August 31, 1911.

Drainage area.—82 square miles (measured from Hayden's atlas).

Gage.—Vertical staff.

Channel.—Fairly permanent.

Discharge measurements.—Made from footbridge during high water and by wading during ordinary stages.

Winter flow.—Ice causes little backwater except for a few days.

Diversions.—The only water diverted above the station is taken out by the Highline canal 1¼ miles above.

Accuracy.—Conditions were favorable for good results, and the estimates should be reliable.

Discharge measurements of West Divide Creek at Beard's ranch, near Raven, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 6	J. B. Stewart	2.50	185
June 13	W. B. Freeman	1.38	39.2

Daily gage height, in feet, of West Divide Creek at Beard's ranch, near Raven, Colo., for 1911.

[J. W. Beard, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	0.75	1.00	0.81	1.28	1.65	2.10	0.84	0.70
2	.75	1.02	.82	1.32	1.65	2.05	.98	.68
3	.75	.98	.78	1.35	1.72	1.88	1.05	.64
4	.75	.98	.79	1.48	2.00	2.00	1.10	.60
5	.75	.98	.82	1.32	2.35	1.88	.98	.60
6	.75	.92	.85	1.29	2.65	1.85	.94	.60
7	.75	.88	.92	1.22	2.75	1.85	1.12	.55
8	.75	.88	.97	1.30	3.20	1.72	.96	.51
9	.75	.82	1.15	1.30	3.30	1.65	.97	.48
10	.75	.78	1.15	1.20	3.10	1.58	.95	.54
11	.85	.72	1.05	1.28	2.40	1.40	.95	.72
12	.88	.72	1.05	1.24	2.30	1.42	.96	.68
13	.90	.72	.92	1.15	2.50	1.42	.94	.71
14	.95	.72	1.00	1.20	2.60	1.42	.94	.68
15	.88	.72	1.02	1.22	2.55	1.48	.86	.62
16	.82	.78	.98	1.22	2.55	1.42	.88	.58
17	.82	.78	.90	1.32	2.60	1.38	.88	.55
18	.82	.78	.95	1.30	2.50	1.38	.88	.52
19	.82	.78	.95	1.40	2.40	1.56	.85	.52
20	.82	.72	.92	1.45	2.10	1.44	1.02	.48
21	.82	.72	.90	1.55	1.98	1.60	.80	.56
22	.82	.72	.92	1.75	2.00	1.45	1.20	.60
23	.85	.72	.98	1.82	2.10	1.34	1.05	.69
24	.85	.78	1.08	1.82	2.30	1.25	.95	.72
25	.85	.78	1.12	1.78	2.20	1.22	.88	.64
26	.92	.78	1.02	1.70	2.25	1.18	.91	.54
27	.98	.78	1.10	1.75	2.05	1.10	.90	.50
28	.98	.78	1.05	1.92	1.98	1.02	.81	.46
29	1.05	....	1.00	2.05	2.10	.88	.78	.42
30	1.12	....	1.15	1.82	2.20	.83	.79	.36
31	1.12	....	1.12	....	2.00	....	.74	.28

NOTE.—Gage heights Jan. 26 to Feb. 6 affected by ice.

Daily discharge, in second-feet, of West Divide Creek at Beard's ranch, near Raven, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	7.5	11	9.3	32	66	125	10	6.0
2	7.5	11	9.6	35	66	118	15	5.6
3	7.5	11	8.4	37	73	93	18	4.8
4	7.5	11	8.7	48	110	110	21	4.0
5	7.5	11	9.6	35	162	93	15	4.0
6	7.5	11	10	32	208	90	14	4.0
7	7.5	11	13	27	222	90	22	3.5
8	7.5	11	15	33	310	73	14	3.1
9	7.5	9.6	24	33	330	66	15	2.8
10	7.5	8.4	24	26	290	58	14	3.4
11	10	6.6	18	32	170	41	14	6.6
12	11	6.6	18	29	155	43	14	5.6
13	12	6.6	13	24	185	43	14	6.3
14	14	6.6	16	26	200	43	14	5.6
15	11	6.6	17	27	192	48	11	4.4
16	9.6	8.4	15	27	192	43	11	3.8
17	9.6	8.4	12	35	200	39	11	3.5
18	9.6	8.4	14	33	185	39	11	3.2
19	9.6	8.4	14	41	170	56	10	3.2
20	9.6	6.6	13	46	125	45	17	2.8
21	9.6	6.6	12	55	107	60	9	3.6
22	9.6	6.6	13	77	110	46	26	4.0
23	10	6.6	15	86	125	36	18	5.8
24	10	8.4	20	86	155	30	14	6.6
25	10	8.4	22	81	140	27	11	4.8
26	10	8.4	17	71	148	25	12	3.4
27	10	8.4	21	77	118	21	12	3.0
28	10	8.4	18	99	107	17	9.3	2.6
29	10	....	16	118	125	11	8.4	2.2
30	10	....	24	86	140	10	8.7	1.6
31	10	....	22	....	110	....	7.2	.9

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Jan. 26 to Feb. 6 interpolated.

Monthly discharge of West Divide Creek at Beard's ranch, near Raven, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	14	7.5	9.4	578	B.
February	11	6.6	8.6	478	B.
March	24	8.4	15.5	953	B.
April	118	24	49.8	2,960	B.
May	330	66	161	9,900	B.
June	125	10	54.6	3,250	B.
July	26	7.2	13.6	836	B.
August	6.6	.9	4.02	247	B.
The period				19,200	

WEST DIVIDE CREEK AT RAVEN, COLO.

Location.—At Ewer's ranch, three-fourths of a mile north of Raven, Colo., about sec. 13, T. 7 S., R. 92 W. Nearest tributary, Halls Gulch, enters between the station and Raven.

Records available.—July 27, 1909, to July 30, 1910, at Raven; September 20, 1910, to March 31, 1911, at present site. The records at the two stations are practically comparable, as only Halls Gulch intervenes.

Drainage area.—101 square miles (measured from Hayden's atlas).

Gage.—Vertical staff.

Channel.—Slightly shifting.

Discharge measurements.—Made from bridge during high water and by wading during ordinary stages.

Winter flow.—Ice causes backwater during a part of the winter period.

Diversions.—There are court decrees for diversions of 174 second-feet from West Divide Creek above the station, and for 114 second-feet between the station and the mouth.

Accuracy.—Data insufficient to warrant estimates of discharge.

Daily gage height, in feet, of West Divide Creek at Raven, Colo., for 1911.

[James Ewers, observer.]

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	1.35	2.05	1.60	16	1.60	1.45	1.60
2	1.35	1.60	1.70	17	1.55	1.55	1.70
3	1.35	1.55	1.60	18	1.50	1.55	1.68
4	1.35	1.50	1.50	19	1.50	1.55	1.65
5	1.40	1.45	1.70	20	1.50	1.55	1.55
6	1.45	1.45	1.60	21	1.45	1.48	1.55
7	1.45	1.40	1.80	22	1.45	1.55	1.75
8	1.45	1.45	2.25	23	1.45	1.58	1.70
9	1.45	1.50	2.35	24	1.50	1.70	1.90
10	1.73	1.55	2.35	25	1.55	1.55	1.85
11	2.00	1.55	1.80	26	1.55	1.60	1.75
12	1.85	1.50	1.75	27	1.70	1.55	1.70
13	1.75	1.45	1.70	28	1.90	1.50	1.70
14	1.60	1.45	1.55	29	2.30		1.68
15	1.55	1.45	1.50	30	2.65		1.75
				31	2.05		1.95

NOTE.—Gage heights affected by ice Jan. 10 to 16 and Jan. 27 to Feb. 2.

GUNNISON RIVER BASIN.

TAYLOR RIVER AT ALMONT, COLO.

Location.—At highway bridge in Almont in sec. 22, T. 51 N., R. 1 E., New Mexico principal meridian, 100 yards above the junction of Taylor and East rivers.

Records available.—July 27, 1910, to December 31, 1911.

Drainage area.—413 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge measurements.—Made from highway bridge.

Winter flow.—Ice causes backwater.

Diversions.—There are no court decrees for diversions from Taylor River, but from Willow Creek, which enters above, there are decrees for 12 second-feet diversion.

Accuracy.—Conditions at this station are favorable for accurate results, and the records should be reliable.

Cooperation.—Field data are furnished by the United States Reclamation Service.

Discharge measurements of Taylor River at Almont, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 18	O. M. Wimmer......	1.70	132	Aug. 10	E. H. Swett..........	2.32	393
May 11	E. H. Swett.........	2.78	744	Oct. 26	.....do...............	2.08	274
June 20[a]	.....do...............	3.50	1,500				

[a] Surface velocity taken. Coefficient of 85 per cent used to reduce velocity.

Daily gage height, in feet, and discharge, in second-feet, of Taylor River at Almont, Colo., for 1910.

[A. D. McKee, observer.]

Day.	July.		Aug.		Sept.		Oct.		Nov.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			2.05	258	1.85	178	1.8	160	1.75	145
2			2.0	235	1.8	160	1.8	160	1.75	145
3			1.95	215	1.85	178	1.8	160	1.75	145
4			1.95	215	2.05	258	1.8	160	1.75	145
5			2.05	258	2.0	235	1.8	160	1.75	145
6			2.0	235	1.95	215	1.8	160	1.75	145
7			2.0	235	1.95	215	1.8	160	1.75	145
8			1.95	215	1.9	195	1.75	145	1.75	145
9			1.9	195	1.9	195	1.75	145	1.75	145
10			1.9	195	1.9	195	1.75	145	1.75	145
11			1.9	195	1.9	195	1.75	145	1.75	145
12			1.9	195	1.9	195	1.75	145	1.7	130
13			2.0	235	1.9	195	1.75	145	1.7	130
14			1.95	215	1.9	195	1.75	145	1.7	130
15			1.9	195	1.9	195	1.75	145	1.7	130
16			1.9	195	1.9	195	1.75	145	1.65	115
17			1.9	195	1.9	195	1.95	215	1.65	115
18			1.9	195	1.9	195	1.9	195	1.65	115
19			1.9	195	1.9	195	1.85	178	1.6	100
20			1.9	195	1.9	195	1.8	160	1.6	100
21			1.9	195	1.9	195	1.8	160	1.6	100
22			1.9	195	1.9	195	1.75	145	1.7	130
23			1.9	195	1.9	195	1.75	145	1.7	130
24			1.9	195	1.9	195	1.75	145	1.7	130
25			1.85	178	1.9	195	1.75	145	1.7	130
26			1.85	178	1.9	195	1.75	145	1.7	130
27	1.9	195	1.85	178	1.85	178	1.75	145		130
28	1.9	195	1.85	178	1.85	178	1.75	145		130
29	1.95	215	1.85	178	1.8	160	1.75	145		130
30	2.15	305	1.85	178	1.8	160	1.75	145		130
31	2.05	258	1.85	178			1.75	145		

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Nov. 27 to 30 estimated. Daily discharge revised and supersedes that published in Water-Supply Paper 289.

Daily gage height, in feet, of Taylor River at Almont, Colo., for 1911.

[Angus McClanahan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.6	1.7	1.6	....	2.8	3.55	3.2	2.4	2.1	3.0	2.1	1.85
2	1.6	1.7	1.6	2.0	2.8	3.8	3.2	2.4	2.1	2.5	2.1	1.85
3	1.6	1.7	1.6	2.0	2.8	3.9	3.2	2.4	2.1	2.3	1.8	1.85
4	1.6	1.7	1.6	1.9	2.6	3.9	3.15	2.4	2.1	2.3	1.8	1.85
5	1.6	1.6	1.6	1.8	2.8	4.0	3.3	2.4	2.1	3.0	1.9	1.85
6	1.6	1.6	1.6	1.8	3.05	3.9	3.4	2.3	2.0	2.75	1.8	1.85
7	1.7	1.6	1.8	1.8	3.15	3.9	3.2	2.3	2.0	2.65	1.8	1.85
8	1.7	1.6	1.85	1.8	3.25	3.9	3.2	2.3	2.0	2.5	1.8	1.85
9	1.7	1.6	1.9	1.8	3.4	3.9	3.1	2.3	2.0	2.5	1.9	1.75
10	1.7	1.6	2.0	1.8	3.4	3.9	3.05	2.3	2.0	2.5	2.05	1.8
11	1.8	1.6	2.0	1.8	2.9	3.8	3.0	2.2	2.0	2.5	2.0	1.8
12	1.8	1.6	2.0	1.7	2.9	3.75	2.9	2.2	2.0	2.4	1.85	1.85
13	1.8	1.6	2.0	1.7	2.95	3.7	2.9	2.7	2.0	2.3	1.85	1.8
14	1.8	1.6	1.9	1.7	2.95	3.7	2.8	2.7	2.0	2.3	1.85	1.8
15	1.8	1.6	1.9	1.7	3.0	3.7	2.8	2.7	2.0	2.3	1.85	1.8
16	1.8	1.6	1.7	1.7	3.0	3.5	2.1	2.7	2.0	2.3	1.85	1.8
17	1.7	1.6	1.7	1.7	3.0	3.5	2.1	2.7	2.0	2.3	1.95	2.1
18	1.7	1.6	1.7	1.8	3.15	3.5	2.1	2.7	2.0	2.2	1.95	1.95
19	1.7	1.6	1.7	1.8	3.4	3.4	2.1	2.7	2.0	2.2	1.95	1.95
20	1.7	1.6	1.7	1.8	3.0	3.4	2.0	2.2	2.1	2.0	1.95	1.95
21	1.7	1.6	1.7	1.8	3.0	3.62	2.0	2.2	2.1	2.0	1.95	2.0
22	1.7	1.6	1.8	2.0	3.0	3.5	2.0	2.2	2.15	1.95	1.95	2.1
23	1.8	1.6	1.8	2.1	3.0	3.4	2.7	2.15	2.2	1.95	1.95	2.1
24	1.8	1.6	1.8	2.2	3.2	3.4	2.6	2.1	2.0	2.0	1.95	2.15
25	1.8	1.6	1.8	2.2	3.3	3.2	2.6	2.1	2.0	2.05	1.85	2.1
26	1.9	1.6	1.8	2.4	3.4	3.2	2.6	2.1	2.0	2.1	1.95	2.1
27	1.9	1.6	1.8	2.4	3.4	3.1	2.5	2.1	2.0	2.1	1.95	2.05
28	1.9	1.6	1.8	2.5	3.6	3.1	2.45	2.1	2.0	2.15	1.85	2.1
29	1.9	....	1.9	2.6	3.4	3.0	2.4	2.1	2.0	2.2	1.85	2.25
30	1.9	....	1.9	2.3	3.5	3.1	2.4	2.1	2.5	2.1	1.85	2.3
31	1.9	....	2.0	....	3.5	....	2.4	2.1	....	2.1	....	2.4

NOTE.—Gage heights distorted by ice Nov. 10 and 11 and Dec. 17 to 31.

Daily discharge, in second-feet, of Taylor River at Almont, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	100	130	100	235	390	1,560	1,170	450	280	960	280	178
2	100	130	100	235	390	1,860	1,179	450	280	520	280	178
3	100	130	100	235	390	1,990	1,170	450	280	390	160	178
4	100	130	100	195	590	1,990	1,120	450	280	390	160	178
5	100	100	100	160	760	2,120	1,280	450	280	960	195	178
6	100	100	100	160	1,010	1,990	1,390	390	235	715	160	178
7	130	100	160	160	1,120	1,990	1,170	390	235	630	160	178
8	130	100	178	160	1,220	1,990	1,170	390	235	520	160	178
9	130	100	195	160	1,390	1,990	1,060	390	235	520	195	145
10	130	100	235	160	1,390	1,990	1,010	390	235	520	190	160
11	160	100	235	160	860	1,860	960	330	235	520	184	160
12	160	100	235	130	860	1,800	860	330	235	450	178	178
13	160	100	235	130	910	1,740	860	670	235	390	178	160
14	160	100	195	130	910	1,740	760	670	235	390	178	160
15	160	100	195	130	960	1,740	760	670	235	390	178	160
16	160	100	130	130	960	1,500	280	670	235	390	178	160
17	130	100	130	130	960	1,500	280	670	235	390	215	......
18	130	100	130	160	1,120	1,500	280	670	235	330	215	......
19	130	100	130	160	1,390	1,390	280	670	235	330	215	......
20	130	100	130	160	960	1,390	235	330	280	235	215	......
21	130	100	130	160	960	1,640	235	330	280	235	215	......
22	130	100	160	235	960	1,500	235	330	305	215	215	......
23	160	100	160	280	960	1,390	670	305	330	215	215	......
24	160	100	160	330	1,170	1,390	590	280	235	235	215	......
25	160	100	160	330	1,280	1,170	590	280	235	258	178	......
26	195	100	160	450	1,390	1,170	590	280	235	280	215	......
27	195	100	160	450	1,390	1,060	520	280	235	280	215	......
28	195	100	160	520	1,620	1,060	485	280	235	305	178	......
29	195	....	195	590	1,390	960	450	280	235	330	178	......
30	195	....	195	390	1,500	1,060	450	280	520	280	178	......
31	195	....	235	....	1,500	....	450	280	....	280	....	......

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Nov. 10 and 11 interpolated. Discharge Dec. 17 to 31 estimated at 160 second-feet.

Monthly discharge of Taylor River at Almont, Colo., for 1910–11.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1910.					
July 27-31	305	195	234	2,320	A.
August	258	178	203	12,500	A.
September	258	160	194	11,500	A.
October	215	145	154	9,470	A.
November	145	100	131	7,800	A.
December			[a] 115	7,070	D.
The period				50,700	
1911.					
January	195	100	145	8,920	A.
February	130	100	104	5,780	B.
March	235	100	161	9,900	A.
April	590	130	234	13,900	A.
May	1,620	390	1,050	64,600	B.
June	2,120	960	1,600	95,200	B.
July	1,390	235	727	44,700	A.
August	670	280	422	25,900	A.
September	520	235	261	15,500	A.
October	960	215	415	25,500	A.
November	280	160	196	11,700	B.
December	178	145	165	10,100	C.
The year	2,120	100	457	332,000	

[a] Estimated.

NOTE.—Monthly discharge for 1910 supersedes that published in Water-Supply Paper 289.

GUNNISON RIVER NEAR GUNNISON, COLO.

Location.—At highway bridge 2 miles below Gunnison. Nearest tributary, Tomichi Creek, enters about 1 mile below.

Records available.—November 27, 1910, to December 31, 1911.

Drainage area.—963 square miles (measured from Hayden's atlas).

Gage.—Chain gage.

Channel.—Somewhat shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months, but no measurements have been made to determine the variation in amount.

Diversions.—There are court decrees for diversions of 250 second-feet from Gunnison River between this station and the forks at Almont, and diversions of 270 second-feet from intervening tributaries.

Accuracy.—Estimates are considered only fair.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data are furnished.

Discharge measurements of Gunnison River near Gunnison, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 14	O. M. Wimmer	0.40	219	Oct. 3	B. S. Clayton	1.22	941
June 17	.....do	3.10	3,830	Nov. 22	.....do	.55	370
Aug. 24	B. S. Clayton	1.00	656	Dec. 13[a]	M. E. Bunger	.50	291

[a] Ice conditions.

Daily gage height, in feet, of Gunnison River near Gunnison, Colo., for 1911.

[Mrs. C. W. Chinery, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.5	0.8	0.9	0.8		2.0	0.7	0.7	1.9	0.75	0.6
2	.4	.8	.8	.9		2.5	.7	.7	1.2	.85	.65
3	.5	.9	.7	1.0		2.8	.7	.7	1.2	.5	.5
4	.5	1.0	.6	1.0		2.5	.6	.6	1.5	.5	.65
5	.5	1.0	.7	1.0		2.9		.6	2.2	.5	.75
6	.8	.9	.7	.9		2.7		.6	1.9	.6	.8
7	.9	.8	.8	.8		2.5		.5	1.6	.5	.85
8	1.2	.7	.9	.7		2.3		.5	1.4	.5	.75
9	1.1	.8	.5	.7		2.3		.5	1.3	.5	.5
10	1.2	.9	.6	.8		2.4		.7	1.35	.5	.5
11	1.1	.5	.7	.8		2.2		.7	1.2	.5	.5
12	1.0	.6	.6	.9		2.1		.7	1.1	.5	.5
13	.9	.7	.5	.8		2.1		.7	1.0	.4	.5
14	.8	.4	.6	.7		2.0		.6	.9	.4	.5
15	1.0	.5	.7	.6		2.0		.7	.9	.4	.4
16	.9	.4	.8	.7		1.8		.7	.8	.4	.4
17	.9	.5	.9	.9	3.1	1.7		.7	.8	.4	.4
18	.8	.6	.8	1.0		1.6		.6	.8	.4	.4
19	.9	.7	.7	.9		1.6	.8	.7	.8	.4	.5
20	1.0	.7	.7	.8		1.5	.8	.7	.8	.5	.5
21	1.1	.7	.7	.8	3.1	1.6		.7	.9	.6	.5
22	.9	.7	.8	.9	3.3	1.6		.7	.9	.5	.5
23	.8	.6	.7	.9	2.9	1.8		.8	.8	.5	.5
24	1.0	.5	.6	.8	2.6	1.7		.8	.85	.5	.5
25	1.1	.6	.6	.7	2.4			.8	.7	.5	.5
26	.9	.6	.7	.8	2.2			.8	.6	.5	.5
27	1.0	.7	.7	.7	2.1		1.0	.7	.5	.5	.5
28	.9	.8	.7	.8	2.1		.9	.7	.4	.6	.5
29	.8		.8	.8	2.2		.8	.8	.9	.6	.5
30	.7		.8	.8	2.0		.7	1.8	.95	.6	.5
31	.9		.9				.8		.8		.5

NOTE.—Ice effect Jan. 1 to Feb. 13 and Dec. 2 to 31.

Daily discharge, in second-feet, of Gunnison River near Gunnison, Colo., for 1911.

Day.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		570	480		2,000	400	400	1,850	440
2		480	570		2,800	400	400	900	525
3		400	670		3,310	400	400	900	265
4		330	670		2,800	330	330	1,280	265
5		400	670		3,480		330	2,320	265
6		440	570		3,140		330	1,850	330
7		480	480		2,800		265	1,420	265
8		570	400		2,480		265	1,150	265
9		265	400		2,480		265	1,020	265
10		330	480		2,640		400	1,080	265
11		400	480		2,320		400	900	265
12		330	570		2,160		400	780	265
13		265	480		2,160		400	670	210
14	210	330	400		2,000		330	570	210
15	265	400	330		2,000		400	570	210
16	210	480	400		1,700		400	480	210
17	265	570	570	3,820	1,560		400	480	210
18	330	480	670	3,820	1,420		330	480	210
19	400	400	570	3,820	1,420	480	400	480	210
20	400	400	480	3,820	1,280	480	400	480	265
21	400	400	480	3,820	1,420		400	570	330
22	400	480	570	4,170	1,420		400	570	265
23	330	400	570	3,480	1,700		480	480	265
24	265	330	480	2,970	1,560		480	525	265
25	330	330	400	2,640	1,200		480	400	265
26	330	400	480	2,320	1,000		480	330	265
27	400	400	400	2,160	800	670	400	265	265
28	480	400	480	2,160	700	570	400	210	330
29		480	480	2,320	600	480	480	570	330
30		480	480	2,000	500	400	1,700	620	330
31		570			400	480		480	

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge interpolated June 18 to 21 and July 25 to 31.

Monthly discharge of Gunnison River near Gunnison, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
February, 15 days	480	210	334	9,910	C.
March	570	265	418	25,700	C.
April	670	330	505	30,000	C.
June 17–30			3,090	85,900	C.
July	3,300	400	1,850	114,000	C.
August, 11 days			463	10,100	C.
September	1,700	265	432	25,700	C.
October	2,320	210	796	48,900	C.
November	525	210	278	16,500	C.
December			[a] 290	17,800	D.
The period				385,000	

[a] Estimated from actual discharge measurement.

GUNNISON RIVER AT RIVER PORTAL, COLO.

Location.—About 300 feet above the portal of the Gunnison tunnel of the United States Reclamation Service, about sec. 10, T. 49 N., R. 7 W., New Mexico principal meridian, 21 miles northeast of Montrose. Nearest tributary, Crystal Creek, enters about 4 miles above.

Records available.—April 7, 1905, to November 6, 1911. September 18, 1903, to December 17, 1905, a station was maintained at Cimarron, about 12 miles above. The records at the two points are not directly comparable as Cimarron River and Crystal Creek enter between.

Drainage area.—4,140 square miles (measured from Land Office map).

Gage.—Staff. The original staff gage, which was bolted to the cliff on the right bank of the river, was dislodged by driftwood June 4, 1909; prior to this time there had been no change in location or datum. From June 5 to 19 an old high-water gage, 100 feet upstream, with its datum 10.08 feet lower than that of the original gage, was used, and readings were reduced to the original datum. August 9, 1909, a new staff gage was installed at the original site and datum. This gage was destroyed November 20, 1909, but replaced in 1910, by the gage at present in use.

Channel.—Slightly shifting. Débris from the Gunnison tunnel is dumped into the river below the station.

Discharge measurements.—Made from car and cable near the station.

Winter flow.—Ice covers the river and records are discontinued for about 4 months each year; the ice attains a thickness of 1 to 2 feet.

Diversions.—Between this station and that near Gunnison there are court decrees for the diversion of 55 second-feet from the Gunnison and 580 second-feet from the intervening tributaries. Just below the station is the entrance of the Gunnison tunnel through which 1,300 second-feet will be diverted into Uncompahgre Valley.

Accuracy.—Although the channel shifts slightly, sufficient measurements have been obtained to make the estimates reliable.

Cooperation.—Station is maintained in cooperation with the United States Reclamation Service, by which the field data are furnished.

Discharge measurements of Gunnison River at River Portal, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 21	Christiansen and Swett	6.05	844	July 16	A. L. B. Moser	9.05	3,850
May 9	Swett and Luney	12.40	8,040	29	.....do	8.40	2,920
June 18	Moser and Luney	12.20	8,400	Aug. 2	.....do	7.80	2,150
July 9	A. L. B. Moser	10.00	5,620	Sept. 9	.....do	6.40	1,040
10	.....do	9.60	4,460				

Daily gage height, in feet, of Gunnison River at River Portal, Colo., for 1911.

[U. S. Reclamation Service engineers, observers.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		7.3	8.8	12.0	9.8	8.0	6.6	8.5	6.6
2		7.6	8.6	12.3	10.5	7.8	6.6	8.6	6.8
3		7.6	8.7	12.3	11.2	7.8	6.6	8.1	6.7
4		7.8	9.3	12.4	11.4	7.6	6.8	7.7	6.4
5		7.5	10.2	12.7	10.8	7.5	6.6	7.8	6.6
6		7.2	11.0	13.1	11.2	7.4	6.6	10.8	6.9
7		7.0	11.4	13.1	11.0	7.2	6.4	9.6	
8		6.9	11.8	13.3	10.4	7.2	6.4	8.8	
9		7.0	12.3	13.6	10.0	7.0	6.3	8.5	
10		7.0	12.5	13.5	9.6	7.2	6.2	8.3	
11		6.8	11.3	13.0	9.2	7.4	6.3	8.0	
12		6.7	10.6	13.1	9.0	7.4	6.3	7.9	
13		6.6	10.7	13.1	9.2	7.4	6.4	7.8	
14		6.4	10.7	13.0	9.5	7.4	6.4	7.6	
15		6.4	11.0	12.7	9.2	7.2	6.5	7.5	
16		6.5	10.9	12.7	9.0	7.0	6.6	7.4	
17		6.8	11.1	12.2	9.0	7.0	6.4	7.2	
18		7.0	11.4	12.0	9.0	7.0	6.3	7.2	
19		7.2	12.0	12.1	9.2	6.8	6.3	7.1	
20		7.7	11.3	12.2	9.3	6.8	6.3	6.9	
21	6.0	8.0	10.4	12.2	9.4	6.8	6.4	6.6	
22		8.6	10.0	12.4	9.4	7.2	6.3	6.6	
23		8.8	10.2	12.0	10.0	7.6	6.4	6.8	
24		9.0	10.8	11.6	9.4	7.6	6.6	7.0	
25		8.8	11.1	11.1	9.0	7.4	6.4	6.9	
26		9.1	11.6	10.6	9.0	7.2	6.3	6.8	
27		9.6	11.4	10.3	8.9	7.0	6.5	7.0	
28		9.8	11.3	10.2	8.6	6.9	6.5	7.0	
29		10.1	11.4	10.2	8.4	6.8	6.5	7.0	
30		9.5	11.4	10.0	8.3	6.8	7.0	6.9	
31			11.6		8.2	6.6		6.6	

Daily discharge, in second-feet, of Gunnison River at River Portal, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1,720	3,380	8,410	4,780	2,420	1,180	3,000	1,180
2	2,000	3,120	8,940	5,860	2,200	1,180	3,120	1,320
3	2,000	3,250	8,940	7,020	2,200	1,180	2,530	1,250
4	2,200	4,050	9,110	7,360	2,000	1,320	2,100	1,040
5	1,900	5,390	9,640	6,350	1,900	1,180	2,200	1,180
6	1,630	6,680	10,300	7,020	1,800	1,180	6,350	1,400
7	1,470	7,360	10,300	6,680	1,630	1,040	4,480	
8	1,400	8,060	10,700	5,700	1,630	1,040	3,380	
9	1,470	8,940	11,200	5,080	1,470	985	3,000	
10	1,470	9,280	11,000	4,480	1,630	925	2,760	
11	1,320	7,190	11,200	3,910	1,800	985	2,420	
12	1,250	6,020	10,300	3,640	1,800	985	2,310	
13	1,180	6,180	10,300	3,910	1,800	1,040	2,200	
14	1,040	6,180	10,200	4,330	1,800	1,040	2,000	
15	1,040	6,680	9,640	3,910	1,630	1,110	1,900	
16	1,110	6,520	9,640	3,640	1,470	1,180	1,800	
17	1,320	6,850	8,760	3,640	1,470	1,040	1,630	
18	1,470	7,360	8,410	3,640	1,470	985	1,630	
19	1,630	8,410	8,580	3,910	1,320	985	1,550	
20	2,100	7,190	8,760	4,050	1,320	985	1,400	
21	2,420	5,700	8,760	4,190	1,320	1,040	1,180	
22	3,120	5,080	9,110	4,190	1,630	985	1,180	
23	3,380	5,390	8,410	5,080	2,000	1,040	1,320	
24	3,640	6,350	7,710	4,190	2,000	1,180	1,470	
25	3,380	6,850	6,850	3,640	1,800	1,040	1,400	
26	3,780	7,710	6,020	3,640	1,630	985	1,320	
27	4,480	7,360	5,540	3,510	1,470	1,110	1,470	
28	4,780	7,190	5,390	3,120	1,400	1,110	1,470	
29	5,240	7,360	5,390	2,880	1,320	1,110	1,470	
30	4,330	7,360	5,080	2,760	1,320	1,470	1,400	
31		7,710		2,640	1,180		1,180	

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Gunnison River at River Portal, Colo., for 1911.

[Drainage area, 4,140 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April	5,240	1,040	2,310	0.558	0.62	137,000	A.
May	9,280	3,120	6,520	1.57	1.81	401,000	B.
June	11,200	5,080	8,750	2.11	2.35	521,000	B.
July	7,360	2,640	4,480	1.08	1.24	275,000	A.
August	2,420	1,180	1,670	.403	.46	103,000	A.
September	1,470	925	1,090	.263	.29	64,900	A.
October	6,350	1,180	2,150	.519	.60	132,000	A.
November 1-6	1,400	1,040	1,230	.297	.07	14,600	A.
The period						1,650,000	

EAST RIVER AT ALMONT, COLO.

Location.—At highway bridge at Almont, 200 feet above the junction of East and Taylor rivers.

Records available.—April 15 to October 8, 1905; July 27, 1910, to December 31, 1911.

Drainage area.—295 square miles (measured from Forest atlas).

Gage.—Vertical staff. No determined relation between datum of present gage and that of gage used in 1905.

Channel.—Practically permanent.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months but no measurements have been made to determine the variation in amount.

Diversions.—There are court decrees for 78 second-feet from East River above the station, and 52 second-feet from tributaries.

Accuracy.—Conditions are favorable for accurate results, and the results should be reliable.

Cooperation.—Station maintained in cooperation with the United States Reclamation Service, by which the field data are furnished.

Discharge measurements of East River at Almont, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 18	O. M. Wimmer	0.76	60	Aug. 10	E. H. Swett	1.72	376
May 11	E. H. Swett	2.50	1,060	Oct. 26	do	1.30	166
June 20	do	2.90	1,490				

Daily gage height, in feet, and discharge, in second-feet, of East River at Almont, Colo., for 1910.

Day.	July.		August.		September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.4	205	1.0	110	0.9	90	0.9	90
2			1.4	205	.95	100	.9	90	.85	80
3			1.4	205	.95	100	.9	90	.85	80
4			1.4	205	1.2	150	.9	90	.85	80
5			1.35	190	1.15	140	.9	90	.85	80
6			1.25	162	1.1	130	.9	90	.85	80
7			1.25	162	1.1	130	.85	80	.85	80
8			1.2	150	1.1	130	.85	80	.85	80
9			1.2	150	1.1	130	.85	80	.85	80
10			1.2	150	1.05	120	.85	80	.85	80

Daily gage height, in feet, and discharge, in second-feet, of East River at Almont, Colo., for 1910—Continued.

Day.	July.		August.		September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
11	....	....	1.2	150	1.05	120	0.85	80	0.85	80
12	....	....	1.2	150	1.0	110	.85	80	.8	70
13	....	....	1.3	175	1.0	110	.85	80	.8	70
14	....	....	1.25	162	1.0	110	.85	80	.8	70
15	....	....	1.25	162	1.0	110	.85	80	.8	70
16	....	....	1.2	150	1.0	110	.85	80	.75	60
17	....	....	1.25	162	1.0	110	1.05	120	.75	60
18	....	....	1.2	150	.95	100	1.0	110	.75	60
19	....	....	1.2	150	.95	100	1.0	110	.7	50
20	....	....	1.2	150	95	100	1.0	110	.7	50
21	....	....	1.15	140	.9	90	1.0	110	.7	50
22	....	....	1.15	140	.9	90	.95	100	.75	60
23	....	....	1.15	140	.9	90	.95	100	.8	70
24	....	....	1.15	140	.9	90	1.0	110	.9	90
25	....	....	1.15	140	.9	90	1.0	110	.9	90
26	....	....	1.1	130	.9	90	1.0	110	.85	80
27	1.15	140	1.1	130	.9	90	.95	100	....	80
28	1.2	150	1.1	130	.9	90	.95	100	....	80
29	1.35	190	1.05	120	.9	90	.95	100	....	80
30	1.4	205	1.05	120	.9	90	.95	100	....	80
31	1.4	205	1.0	110	....	....	.9	90	....	....

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Nov. 27 to 30 estimated at 80 second-feet.

Daily gage height, in feet, of East River at Almont, Colo., for 1911.

[Angus McClanahan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.7	0.8	0.7	....	1.9	3.2	2.6	1.7	1.3	2.1	1.2	1.05
2	.7	.8	.7	1.2	1.9	3.3	2.5	1.7	1.3	1.8	1.2	1.05
3	.7	.8	.7	1.2	2.0	3.3	2.5	1.6	1.3	1.7	1.1	1.05
4	.7	.8	.7	1.2	2.2	3.3	2.4	1.6	1.3	1.7	1.1	1.05
5	.7	.7	.7	1.2	2.4	3.6	2.55	1.6	1.2	2.0	1.2	1.15
6	.7	.7	.7	1.2	2.55	3.5	3.1	1.6	1.2	1.9	1.1	1.15
7	.8	.7	.7	1.1	2.65	3.45	2.45	1.6	1.2	1.8	1.0	1.1
8	.8	.7	.8	1.1	2.85	3.75	2.45	1.5	1.2	1.8	1.0	1.05
9	.8	.7	.8	1.1	3.05	3.6	2.35	1.5	1.2	1.8	1.0	1.15
10	.8	.7	.8	1.1	3.05	....	2.3	1.4	1.2	1.6	1.1	1.1
11	.9	.7	.8	1.1	2.5	3.8	2.3	1.5	1.2	1.6	1.1	1.15
12	.9	.7	.8	1.1	2.4	3.75	2.2	1.6	1.2	1.6	1.0	1.15
13	.9	.7	.8	1.1	2.5	3.7	2.2	1.6	1.2	1.5	1.05	1.05
14	.9	.7	.7	1.0	2.45	3.7	2.1	1.6	1.2	1.5	1.05	1.05
15	.9	.7	.65	1.0	2.55	3.7	2.1	1.6	1.2	1.5	1.05	1.05
16	.9	.7	.6	1.1	2.55	3.5	2.8	1.6	1.2	1.5	1.05	1.05
17	.7	.7	.6	1.2	2.55	3.5	2.8	1.6	1.2	1.5	1.0	1.1
18	.7	.7	.6	1.2	2.75	3.05	2.8	1.6	1.2	1.4	1.05	1.1
19	.7	.7	.6	1.3	2.9	3.0	2.8	1.6	1.2	1.4	1.15	1.05
20	.7	.7	.6	1.3	2.45	3.05	2.7	1.6	1.3	1.3	1.15	1.05
21	.7	.7	.7	1.4	2.45	3.22	2.7	1.6	1.3	1.3	1.15	1.15
22	.7	.7	.75	1.6	2.4	3.05	2.7	1.6	1.3	1.25	1.15	1.2
23	.7	.7	.8	1.65	2.5	2.85	2.0	1.6	1.4	1.25	1.15	1.25
24	.8	.7	.9	1.8	2.8	2.8	1.9	1.6	1.4	1.3	1.05	1.25
25	.8	.7	.85	1.9	2.85	2.65	1.9	1.5	1.3	1.2	.95	1.25
26	.9	.7	.9	1.95	2.95	2.5	1.8	1.45	1.3	1.25	1.05	1.25
27	.9	.7	.9	2.15	2.9	2.4	1.8	1.4	1.3	1.25	1.05	1.35
28	.9	.7	.9	2.2	2.9	2.4	1.8	1.4	1.4	1.3	.95	1.35
29	.9	....	1.0	2.3	2.9	2.5	1.7	1.4	1.4	1.3	1.05	1.25
30	.9	....	1.2	2.0	2.85	2.45	1.7	1.4	1.5	1.2	1.05	1.2
31	.9	....	....	....	3.0	....	1.7	1.3	....	1.2	....	1.1

NOTE.—Gage heights Jan. 11 to 15, 26 to 31, and Nov. 19 to 23; Dec. 5–6, 9, 11, 12, and 21 to 30 affected by ice.

Daily discharge, in second-feet, of East River at Almont, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	50	70	50	150	505	1,820	1,160	355	175	670	150	120
2	50	70	50	150	505	1,940	1,060	355	175	425	150	120
3	50	70	50	150	585	1,940	1,060	295	175	355	130	120
4	50	70	50	150	760	1,940	960	295	175	355	130	120
5	50	50	50	150	960	2,300	1,110	295	150	585	150	124
6	50	50	50	150	1,110	2,180	1,710	295	150	505	130	127
7	70	50	50	130	1,220	2,120	1,010	295	150	425	110	130
8	70	50	70	130	1,440	2,480	1,010	245	150	425	110	120
9	70	50	70	130	1,660	2,300	910	245	150	425	110	125
10	70	50	70	130	1,660	2,420	860	205	150	295	130	130
11	60	50	70	130	1,060	2,540	860	245	150	295	130	127
12	60	50	70	130	960	2,480	760	295	150	295	110	124
13	60	50	70	130	1,060	2,420	760	295	150	245	120	120
14	60	50	50	110	1,010	2,420	670	295	150	245	120	120
15	60	50	42	110	1,110	2,420	670	295	150	245	120	120
16	60	50	35	130	1,110	2,180	1,380	295	150	245	120	120
17	50	50	35	150	1,110	2,180	1,380	295	150	245	110	130
18	50	50	35	150	1,320	1,660	1,380	295	150	205	120	130
19	50	50	35	175	1,490	1,600	1,380	295	150	205	120	120
20	50	50	35	175	1,010	1,660	1,270	295	175	175	120	120
21	50	50	50	205	1,010	1,840	1,270	295	175	175	120	121
22	50	50	60	295	960	1,660	1,270	295	175	162	120	122
23	50	50	70	325	1,060	1,440	585	295	205	162	120	123
24	70	50	90	425	1,380	1,380	505	295	205	175	120	124
25	70	50	80	505	1,440	1,220	505	245	175	150	100	125
26	70	50	90	545	1,540	1,060	425	225	175	162	120	126
27	70	50	90	715	1,490	960	425	205	175	162	120	127
28	70	50	90	760	1,490	960	425	205	205	175	100	128
29	70	....	90	860	1,490	1,060	355	205	205	175	120	129
30	70	....	110	585	1,440	1,010	355	205	245	150	120	130
31	70	....	150	....	1,600	....	355	175	....	150	....	130

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge interpolated for days on which the gage heights were affected by ice.

Monthly discharge of East River near Almont, Colo., for 1910-11.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1910.					
July 27-31	205	140	178	1,760	B.
August	205	110	154	9,470	B.
September	150	90	107	6,370	B.
October	120	80	94.2	5,790	B.
November	90	50	73.7	4,390	B.
December	....	....	[a] 60.0	3,690	D.
The period	....	....	....	31,500	
1911.					
January	70	50	59.7	3,670	B.
February	70	50	52.9	2,940	B.
March	150	35	64.7	3,980	B.
April	860	110	268	15,900	B.
May	1,660	505	1,180	72,600	B.
June	2,540	960	1,850	110,000	B.
July	1,710	355	898	55,200	B.
August	355	175	272	16,700	B.
September	245	150	169	10,100	B.
October	670	150	279	17,200	B.
November	150	100	122	7,260	B.
December	130	120	124	7,620	B.
The year	2,540	35	445	323,000	

[a] Estimated.

CEMENT CREEK NEAR CRESTED BUTTE, COLO.

Location.—At Ahren's ranch, in sec. 22, T. 14 S., R. 85 W., about 7 miles southeast of Crested Butte. No tributaries between the station and the mouth.

Records available.—November 23, 1910, to December 14, 1911.

Drainage area.—32 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Somewhat shifting after high water.

Discharge measurements.—Made by wading except during extreme flood stage when they are made from a footbridge.

Winter flow.—Ice causes little if any backwater at this station, owing to hot springs above.

Diversions.—There are court decrees for diversions of 8.5 second-feet from Cement Creek above the station.

Accuracy.—Conditions are favorable for accurate results but because of missing gage heights the estimates can not be considered better than fair.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Cement Creek near Crested Butte, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 16	O. M. Wimmer......	0.35	12.0	Oct. 28	O. M. Wimmer......	0.50	28.2
June 19	.....do...............	1.40	184	Dec. 14	H. B. Waha.........	.45	20.8
Sept. 7	.....do...............	.55	26.2				

Daily gage height, in feet, of Cement Creek near Crested Butte, Colo., for 1911.

[P. L. Snodgrass, observer.]

Day.	Jan.	Feb.	Mar.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.3	0.35	....	0.8	....	1.3	0.8	0.6	0.6	0.4	....
2	.3	.3	....	.6	1.6	1.2	.8	.6	.65	.4	....
3	.3	.3	....	.7	1.6	1.4	....	....	.6	.45	....
4	.3	.4	....	.9	1.7	....	.8	....	.6	.4	0.4
5	.3	.4	....	.9	1.7	1.5	....	.6	.65	.4	.4
6	.3	.3	....	.9	....	1.4	....	....	.7	.4	.4
7	.3	.3	....	.8	....	1.3	.8	.55	.7	....	.4
8	.3	.3	....	.9	....	1.3	....	.55	.65	.45	....
9	.3	.3	....	1.0	1.8	....	....	.55	.6	.4	....
10	.3	.3	....	1.0	1.8	1.1	....	....	....	.4	.4
11	.3	.4	....	1.2	....	1.1	.7	.55	.55	.4	.4
12	.3	.4	....	....	....	....	....	.55	....	....	....
13	.3	.3	....	1.0	....	1.1	....	....	....	....	....
14	.3	.3	....	.9	....	....	....	.52	.5	....	.45
15	.3	.4	....	....	....	.9	.7	....	....	....	....
16	.3	.4	0.4	1.0	....	.95	....	.5	.5	....	....
17	.3	.3	.35	....	....	....	....	.5	.45	....	....
18	.3	.4	.4	....	....	....	.65	....	....	....	....
19	.3	.35	.35	1.1	1.4	.9	.6	.55	.45	....	....
20	.3	.35	.35	1.2	....	....	....	.55	....	....	....
21	.3	.35	.35	1.1	....	....	.65	....	.45	....	....
22	.4	.35	.4	....	1.4	.9	.7	.55	.45	....	....
23	.3	.35	.35	....	1.25	.9	....	.55	.45	....	....
24	.3	.35	.45	....	1.2	.9	.6	....	.45	....	....
25	.3	.3	.4	1.3	1.3	....	....	.52	.5	....	....
26	.35	.3	.35	1.3	1.3	.8	....	....	.5	....	....
27	.3	.3	.35	....	....	.8	....	.55	.55	....	....
28	.4	.3	.35	....	1.3	.8	.6	.55	.5	....	....
29	.4	....	.35	1.4	1.2	.8	....	.55	.4	....	....
30	.4	....	.4	1.4	1.3	.8	....	.7	.45	....	....
31	.3	....	.4	....	....	....	....	....	.4	....	....

Daily discharge, in second-feet, of Cement Creek near Crested Butte, Colo., for 1910.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		11	11		11	21		11
2		11	12		11	22		11
3		11	13		11	23	17	11
4		11	14		11	24	11	11
5		11	15		11	25	11	11
6		11	16		11	26	11	11
7		11	17		11	27	17	11
8		11	18		11	28	15	11
9		11	19		11	29	14	11
10		11	20		11	30	13	11
						31		11

Daily discharge, in second-feet, of Cement Creek near Crested Butte, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11	14	12	61	216	160	61	35	35	17	17
2	11	11	12	35	232	138	61	35	41	17	17
3	11	11	12	47	232	184	61	35	35	21	17
4	11	17	12	77	258	196	61	35	35	17	17
5	11	17	12	77	258	208	61	35	41	17	17
6	11	11	13	77	265	184	61	32	47	17	17
7	11	11	13	61	272	160	61	30	47	19	17
8	11	11	13	77	279	160	58	30	41	21	17
9	11	11	13	96	285	182	54	30	35	17	17
10	11	11	13	96	285	116	50	30	32	17	17
11	11	17	14	138	274	116	47	30	30	17	17
12	11	17	14	117	263	116	47	30	28	17	18
13	11	11	14	96	252	116	47	28	26	17	20
14	11	11	14	77	241	97	47	27	25	17	21
15	11	17	14	86	230	77	47	26	25	17	20
16	11	17	17	96	219	86	45	25	25	17	19
17	11	11	14	102	208	82	43	25	21	17	18
18	11	17	17	109	197	79	41	28	21	17	17
19	11	14	14	116	184	77	35	30	21	17	16
20	11	14	14	138	184	77	38	30	21	17	16
21	11	14	14	116	184	77	41	30	21	17	16
22	17	14	17	127	184	77	47	30	21	17	16
23	11	14	14	138	149	77	41	30	21	17	16
24	11	14	21	149	138	77	35	28	21	17	16
25	11	11	17	160	160	69	35	27	25	17	16
26	14	11	14	160	160	61	35	28	25	17	16
27	11	11	14	168	160	61	35	30	30	17	16
28	17	11	14	176	160	61	35	30	25	17	16
29	17		14	184	138	61	35	30	17	17	16
30	17		17	184	160	61	35	47	21	17	16
31	11		17	200		61	35		17		16

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge for days for which there are no gage heights estimated by interpolation, comparison with records at other stations, and from climatologic data.

Monthly discharge of Cement Creek near Crested Butte, Colo., for 1910–11.

[Drainage area, 32 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1910.							
November 23–30	17	11	13.6	0.425	0.13	216	C.
December	11	11	11.0	.344	.40	676	C.
1911.							
January	17	11	11.9	.372	.43	732	C.
February	17	11	13.2	.413	.43	733	C.
March	21	12	14.3	.447	.52	879	C.
April			[a] 30.0	.938	1.05	1,790	D.
May	200	35	114	3.56	4.10	7,010	C.
June	265	138	214	6.69	7.46	12,700	C.
July	208	61	108	3.38	3.90	6,640	C.
August	61	35	46.3	1.45	1.67	2,850	C.
September	47	25	30.5	.953	1.06	1,810	B.
October	47	17	28.3	.884	1.02	1,740	B.
November	21	17	17.3	.541	.60	1,030	C.
December	21	16	17.0	.531	.61	1,050	C.
The year	265	11	53.7	1.68	22.85	39,000	

[a] Estimated by comparison with other streams.

QUARTZ CREEK NEAR PITKIN, COLO.

Location.—On highway bridge in sec. 8, T. 50 N., R. 4 E. New Mexico principal meridian, 1 mile southwest of Pitkin. Nearest tributary enters about 2 miles below the station.

Records available.—December 12, 1910, to December 31, 1911.

Drainage area.—54 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Slightly shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes little if any backwater at this station.

Diversions.—No water is diverted above the station. Below the station there are court decrees for 30 second-feet.

Accuracy.—Conditions are favorable for fairly accurate results, and the records are considered fair or possibly good.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Quartz Creek near Pitkin, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 15	O. M. Wimmer	0.60	23.9	Oct. 27	O. M. Wimmer	0.87	37.0
June 16	do	1.65	185	Dec. 13[a]	H. B. Waha	.65	24.2
Sept. 6	do	.80	37.3				

[a] Ice conditions.

Daily gage height, in feet, of Quartz Creek near Pitkin, Colo., for 1911.

[J. B. Cammann, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	0.7	0.5	0.6	1.0	1.7	1.4	1.1	0.8	......	0.7	0.7
2	......	.7	.5	.6	.95	1.7	1.4	1.1	.8	......	.7	.7
3	......	.7	.5	.6	.95	1.7	1.35	.95	.8	0.9	.7	.7
4	......	.6	.5	.6	1.0	1.8	1.3	......	.8	.9	.7	.7
5	......	.6	.5	......	1.05	......	1.3	.95	.8	1.0	......	.7
6	......	.6	.5	......	1.1	......	1.3	.9	.8	1.1	.7	.7
7	......	.6	.55	......	1.2	......	1.3	.9	......	1.1	.7	.7
8	......	.6	.55	......	1.4	......	1.25	.9	......	1.1	.7	.7
9	......	.65	.55	......	1.4	......	1.25	.9	......	1.1	.7	.7
10	......	.65	.55	......	1.4	......	1.25	.9	.8	1.1	.7	......
11	......	.65	.55	......	1.4	......	1.25	.9	.8	1.1	.7	.7
12	......	.6	.55	......	1.25	......	1.25	.9	.8	1.0	......	.7
13	......	.55	.55	......	1.4	......	1.25	.9	.8	.9	......	.7
14	......	.5	.55	......	1.3	......	1.2	.9	.8	.9	......	.7
15	......	.5	.6	.65	1.3	......	......	......	.8	.8	......	.7
16	......	.5	.55	.65	1.3	1.65	......	.9	.8	.8	......	.7
17	0.58	.5	.55	.65	......	......	1.2	......	.75	.8	......	.7
18	.58	.5	.5	.65	......	......	1.15	.9	.75	.8	......	.7
19	.58	.5	.5	.65	1.3	......	1.1	.9	.75	.8	.7	.65
20	.58	.5	.5	.65	1.3	......	1.1	.9	.75	......	.7	.65
21	.58	.5	.5	......	1.3	......	1.2	......	.75	.7	.8	.65
22	.5	.5	.5	......	1.3	......	1.25	......	.75	......	.7	.65
23	.5	.5	.5	......	1.3	......	1.3	......	.75	.7	.7	.65
24	.5	.5	.5	......	1.3	......	......	......	.75	.7	.7	.65
25	.5	.5	.5	......	1.3	......	1.2	......	......	.7	.7	.65
26	.5	.5	.5	......	1.3	......	1.15	......	......	.7	.8	.65
27	.5	.5	.5	1.05	1.4	......	1.15	.8	......	.7	.9	.65
28	.5	.5	.55	1.0	1.5	......	1.1	.8	......	.7	1.0	.65
29	.6	......	.6	1.0	1.5	......	1.1	.8	......	.7	.7	.7
30	.7	......	.6	1.0	1.5	......	1.1	.8	......	.7	.8	.65
31	.7	......	.6	......	1.5	......	1.1	.8	......	.7	......	.65

NOTE.—Gage heights Nov. 27 and 28 affected by backwater from an ice jam. Effect of ice during January and December very slight.

Daily discharge, in second-feet, of Quartz Creek near Pitkin, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	27	20	23	50	208	112	61	33	38	27	27
2	......	27	20	23	46	208	112	61	33	40	27	27
3	......	27	20	23	46	208	102	46	33	41	27	27
4	......	23	20	23	50	252	91	46	33	41	27	27
5	......	23	20	23	56	......	91	46	33	50	27	27
6	......	23	20	23	61	......	91	41	33	61	27	27
7	......	23	22	23	74	......	91	41	33	61	27	27
8	......	23	22	24	112	......	82	41	33	61	27	27
9	......	25	22	24	112	......	82	41	33	61	27	27
10	......	25	22	24	112	......	82	41	33	61	27	27
11	......	25	22	24	112	......	82	41	33	61	27	27
12	......	23	22	25	82	......	82	41	33	50	27	27
13	......	22	22	25	112	......	82	41	33	41	27	27
14	......	20	22	25	91	......	74	41	33	41	27	27
15	......	20	23	25	91	......	74	41	33	33	27	27
16	......	20	22	25	91	180	74	41	33	33	27	27
17	22	20	22	25	91	......	74	41	30	33	27	27
18	22	20	20	25	91	......	68	41	30	33	27	27
19	22	20	20	25	91	......	61	41	30	33	27	25
20	22	20	20	25	91	......	61	41	30	30	27	25
21	22	20	20	30	91	......	74	40	30	27	33	25
22	20	20	20	35	91	......	82	38	30	27	27	25
23	20	20	20	40	91	......	91	37	30	27	27	25
24	20	20	20	44	91	......	82	36	30	27	27	25
25	20	20	20	48	91	......	74	35	32	27	27	25

Daily discharge, in second-feet, of Quartz Creek near Pitkin, Colo., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	20	20	20	52	91	....	68	34	33	27	33	25
27	20	20	20	56	112	....	68	33	34	27	31	25
28	20	20	22	50	138	....	61	33	35	27	29	25
29	23	....	23	50	138	....	61	33	36	27	27	27
30	27	....	23	50	138	....	61	33	37	27	33	25
31	27	....	23	....	138	....	61	33	....	27	....	25

NOTE.—Discharge determined from a fairly well defined rating curve. Discharge Jan. 1 to 16 estimated at 20 second-feet. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Quartz Creek near Pitkin, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	27	....	20.9	1,290	C.
February	27	20	22.0	1,220	B.
March	23	20	21.1	1,300	B.
April	56	23	31.2	1,860	C.
May	138	46	92.6	5,690	C.
June, 5 days	252	189	213	2,110	C.
July	112	61	79.1	4,860	C.
August	61	33	40.6	2,500	C.
September	37	30	32.5	1,930	B.
October	61	27	38.7	2,380	B.
November	33	27	27.8	1,650	B.
December	27	25	26.2	1,610	B.
The period	....	....	....	28,400	

SAPINERO CREEK[1] AT SAPINERO, COLO.

Location.—At highway bridge in sec. 28, T. 49 N., R. 4 W., New Mexico principal meridian, half a mile northeast of Sapinero, Colo. No tributaries below the station.

Records available.—March 17, 1911, to December 31, 1911.

Drainage area.—84 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Somewhat shifting after high water.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater and discharge measurements are made to determine the flow.

Diversions.—Water sufficient to irrigate approximately 300 acres is diverted above the station.

Accuracy.—Gage heights are somewhat fragmentary, but the available records are good.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Sapinero Creek at Sapinero, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 17	O. M. Wimmer	0.42	31.6	Oct. 24	O. M. Wimmer	−0.10	18.8
June 18	.....do	1.46	283	Dec. 15[a]	H. B. Waha	.32	11.9
Sept. 4	.....do	−.18	18.9				

[a] Ice conditions.

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[1] Known locally as Soap Creek.

Daily gage height, in feet, of Sapinero Creek at Sapinero, Colo., for 1911.

[John Schuttler, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		1.03	1.4	1.95			−0.28	−0.03	−0.1	0.2
2		1.16	1.25	1.9			−.28	.1	−.1	.4
3		1.18		1.95				.1		.4
4				1.95		0.04		.22	−.2	.22
5						.04		.47		.05
6		1.03				−.04		.52		
7		.9				−.04				.1
8		.88				−.06				.15
9		.96				−.06		.22		.12
10		.93						.22		.15
11		.88	1.9					.17		.2
12		.86	1.55				−.28	.12		.2
13		.78	1.8	2.05			−.28	.07		
14		.76	1.75	1.9			−.23			.35
15		.76	1.85	1.95				.02		.35
16		.8	1.95	1.8	0.34			.02		.4
17	0.4	1.0	1.95	1.7				.02		
18	.35	1.08		1.46				−.07		.65
19	.4							−.08		.6
20	.35		1.5					−.08		.6
21			1.31				−.28	−.08		.22
22			1.16				−.28	−.08		.2
23			1.36		.42	−.16	−.23	−.18		.15
24	.65	1.8	1.75		.34	−.16				
25	.62	1.75	1.85		.34	−.21				
26	.5	1.9	2.0		.34	−.26				.7
27	.5	2.05	1.8		.34	−.26			.3	
28	.53	2.15	1.75		.24	−.26			.25	
29	.66	2.05			.24			−.13	.3	.7
30	.78	1.7	1.7		.24			−.18	.55	
31	.9		1.8			−.26				

NOTE.—Gage heights affected by ice Nov. 27 to Dec. 31.

Daily discharge, in second-feet, of Sapinero Creek at Sapinero, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		172	265	408		32	14	22	19
2		205	228	395		30	14	28	19
3		210	247	408		28	14	28	
4		198	266	408		25	14	36	16
5		185	285			25	14	64	
6		172	304			21	14	72	
7		141	323			21	14	60	
8		136	342			21	14	48	
9		155	360			21	14	36	
10		148	378			21	14	36	
11		136	395			21	14	32	
12		131	304			21	14	29	
13		112	369	434		20	14	26	
14		108	356	395		20	15	25	
15		108	382	408		20	15	24	
16		117	408	369	46	19	15	24	
17	32	165	408	343		19	15	24	
18	28	185	369	283		19	14	20	
19	32	215	330			18	14	20	
20	28	246	291			18	14	20	
21	42	277	242			18	14	20	
22	56	308	205			17	14	20	
23	69	338	255		56	17	15	17	
24	82	369	356		46	17	15	17	
25	76	356	382		46	16	16	17	

Daily discharge, in second-feet, of Sapinero Creek at Sapinero, Colo., for 1911—Contd.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
26	48	395	421	....	46	14	17	17	....
27	48	434	369	....	46	14	18	18	....
28	55	460	356	....	37	14	19	18	....
29	85	434	350	....	37	14	20	18	....
30	112	343	343	....	37	14	21	17	....
31	141	....	369	....	34	14	....	18	....

NOTE.—Daily discharge determined from two fairly well-defined rating curves, one applicable Mar. 17 to June 4, the other June 13 to Nov. 4.

Monthly discharge of Sapinero Creek at Sapinero, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March, 15 days	141	28	62.3	1,850	B.
April	460	106	232	13,800	B.
May	421	205	331	20,400	C.
June, 10 days	408	283	385	7,630	B.
July, 10 days	56	34	43.1	855	B.
August	32	14	19.6	1,210	C.
September	21	14	15.1	898	C.
October	72	17	28.1	1,730	B.
November	....	....	[a] 14.0	833	D.
December	....	....	[a] 12.0	738	D.
The period	....	....	....	49,900	

[a] Estimated from discharge measurements.

UNCOMPAHGRE RIVER BASIN.

UNCOMPAHGRE RIVER AT OURAY, COLO.

Location.—Near highway bridge in sec. 31, T. 44 N., R. 7 W. New Mexico principal meridian, half a mile south of Ouray, Colo. Nearest tributary, Canon Creek enters 150 feet below; nearest tributary above is Bear Creek.

Records available.—January 25, 1911, to December 31, 1911. January 7 to March 17, 1908, records were kept at the power plant of the Ouray Electric Light & Power Co., 1 mile south of Ouray, and were furnished through the courtesy of Wheeler & Whinnerah.

Drainage area.—44 square miles (measured on topographic sheet).

Gage.—Vertical staff.

Channel.—Permanent, except at time of high water when channel scours and fills.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Little if any backwater from ice at this station, as channel remains open during the year.

Diversions.—Water is diverted 2 miles above the station by the Ouray Light & Power Co. This amounts to approximately 6 second-feet and is returned to the river below the station.

Accuracy.—Records for stages below 55 second-feet are good, but those above that point are somewhat uncertain.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Uncompahgre River at Ouray, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 25	O. M. Wimmer	0.20	6.0	Oct. 26	O. M. Wimmer	0.80	33.5
Mar. 20	do	.40	12.1	Dec. 18	H. B. Waha	.45	14.1
Sept. 3	do	.80	42.6				

Daily gage height, in feet, of Uncompahgre River at Ouray, Colo., for 1911.

[T. J. Watkins, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	0.4	....	1.15	1.0	2.6	2.0	1.5	0.8	2.4	0.8	0.4
2	....	.0	....	1.05	1.0	2.5	2.1	....	.8	1.8	.7	.4
3	....	.1	....	.9	1.0	2.5	2.3	....	.8	1.6	.7	.4
4	....	.2	....	.7	1.3	2.8	2.0	1.5	.8	1.6	.7	.4
5	....	.1	0.5	.7	1.7	3.2	2.0	....	.8	5.9	.8	.4
6	....	.0	.4	.7	2.0	3.2	2.1	....	.8	2.8	.8	.4
7	....	.0	.2	.6	1.9	3.1	2.0	....	.7	2.5	.8	.35
8	....	.0	.3	.6	2.1	3.1	1.9	....	.7	2.0	.8	.35
9	....	.0	.2	.6	2.1	3.1	1.9	....	.7	1.6	.8	.35
10	....	.0	.2	.4	2.1	3.0	1.9	....	.7	1.5	.7	.3
11	....	.1	.2	.55	1.8	3.0	1.8	1.4	.7	1.4	.6	.3
12	....	.1	.2	.6	1.7	3.1	1.9	1.4	.7	1.3	.7	.35
13	....	.0	.3	.4	1.7	3.1	3.4	1.3	.7	1.2	.8	.35
14	....	....	.2	.5	1.6	3.0	2.3	1.3	.7	1.1	.8	.35
15	....	....	.1	.4	1.6	2.9	2.4	1.2	.7	1.0	.7	.35
16	....	....	.2	.6	1.7	2.9	2.4	1.0	.7	1.0	.8	.35
17	....	....	.3	.8	1.9	2.8	2.4	1.0	.7	1.0	.6	.45
18	....	....	.3	.9	2.1	2.8	2.5	1.0	.7	1.0	.6	.4
19	....	.0	.3	1.0	2.2	2.7	2.4	.9	.7	.9	.6	.4
20	....	.0	.4	1.0	1.9	2.7	2.2	.9	.6	.8	.6	.35
21	....	....	.4	1.1	1.7	2.6	2.0	.9	.7	.7	.5	.35
22	....	....	.4	1.3	1.6	2.6	2.0	.9	.7	.7	.5	.3
23	....	....	.45	1.4	1.7	2.5	2.0	.9	.8	.6	.45	.25
24	....	....	.5	1.4	2.1	2.6	1.9	.9	.6	.6	.4	.25
25	0.2	....	.4	1.3	2.3	2.4	1.9	.9	.6	.6	.4	.25
26	.2	....	.35	1.3	2.4	2.5	1.8	.9	.8	.7	.35	.25
27	.0	....	.35	1.5	2.2	2.4	1.7	.9	.9	.8	.35	.3
28	.3	....	.35	1.4	2.4	2.3	1.6	.9	1.0	.9	.35	.3
29	.25	....	.45	1.5	2.4	2.2	1.6	.9	1.3	.9	.4	.3
30	.25	....	.6	1.3	2.5	2.2	1.6	.8	1.7	.8	.4	.3
31	.3	....	.9	....	2.7	....	1.5	.8	....	.8	....	.3

Daily discharge, in second-feet, of Uncompaghre River at Ouray, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	12	10	68	53	325	191	110	32	277	32	12
2	....	2	10	58	53	300	211	110	32	155	25	12
3	....	4	10	43	53	300	254	110	32	124	25	12
4	....	6.5	10	25	85	375	191	110	32	124	25	12
5	....	4	16	25	139	475	191	108	32	(a)	32	12
6	....	2	12	25	191	475	211	106	32	375	32	12
7	....	2	6.5	20	172	450	191	104	25	300	32	10
8	....	2	9	20	211	450	172	102	25	191	32	10
9	....	2	6.5	20	211	450	172	100	25	124	32	10
10	....	2	6.5	12	211	425	172	98	25	110	25	9
11	....	4	6.5	18	155	425	155	97	25	97	20	9
12	....	4	6.5	20	139	450	172	97	25	85	25	10
13	....	2	9	12	139	450	525	85	25	74	32	10
14	....	2	6.5	16	124	425	254	85	25	63	32	10
15	....	2	4	12	124	400	277	74	25	53	25	10
16	....	2	6.5	20	139	400	277	53	25	53	32	10
17	....	2	9	32	172	375	277	53	25	53	20	14
18	....	2	9	43	211	375	300	53	25	53	20	12
19	....	2	9	53	232	350	277	43	25	43	20	12
20	....	2	12	53	172	350	232	43	20	32	20	10
21	....	4	12	63	139	325	191	43	25	25	16	10
22	....	4	12	85	124	325	191	43	25	25	16	9
23	....	4	14	97	139	300	191	43	32	20	14	7.8
24	....	4	16	97	211	325	172	43	20	20	12	7.8
25	6.5	4	12	85	254	277	172	43	20	20	12	7.8
26	6.5	4	10	85	277	300	155	43	32	25	10	7.8
27	2	4	10	110	232	277	139	43	43	32	10	9
28	9	4	10	97	277	254	124	43	53	43	10	9
29	7.8	4	14	110	277	232	124	43	85	43	12	9
30	7.8	....	20	85	300	232	124	32	139	32	12	9
31	9	....	43	....	350	....	110	32	....	32	....	9

[a] Discharge not known, as the rating curve has not been developed to this stage.

NOTE.—Daily discharge Feb. 14 to 18 estimated at 2 second-feet; Feb. 21 to 28, 4 second-feet, and Mar. 1 to 4, at 10 second-feet. Discharge interpolated for other days for which gage heights are missing.

Monthly discharge of Uncompahgre River at Ouray, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January 25-31	9	2	6.94	96	B.
February	12	2	3.26	188	B.
March	43	4	11.2	689	A.
April	110	12	50.3	2,990	A.
May	350	53	179	11,000	B.
June	475	232	362	21,500	C.
July	525	110	206	12,700	B.
August	110	32	70.7	4,350	B.
September	139	20	33.7	2,000	A.
October 30 days	([a])	20	90.1	5,360	B.
November	32	10	22.1	1,320	A.
December	14	7.8	10.1	621	A.
The period				62,800	

[a] Maximum discharges for the year occurred October 5, but the amount is not known.

UNCOMPAHGRE RIVER NEAR FORT CRAWFORD, COLO.

Location.—On the north line of sec. 23, T. 48 N., R. 9 W., New Mexico principal meridian, 2 miles north of Fort Crawford, Colo. Nearest important tributary, Happy Canyon Creek, enters about 8 miles downstream.

Records available.—July 11, 1910, to October 31, 1911. From October 2, 1907, to October 31, 1910, a station was maintained half a mile west of Fort Crawford, but the records at the two stations are not directly comparable as diversions amounting to 200 second-feet and more during the irrigation season are made between the two points.

Drainage area.—497 square miles.

Gage.—Vertical staff.

Channel.—Somewhat shifting; frequent measurements necessary.

Discharge measurements.—Made from the bridge.

Winter flow.—During the winter months observations are discontinued because of ice.

Diversions.—Beside the diversions mentioned previously many other diversions are made above and below the station. Uncompahgre River is so overappropriated that the United States Reclamation Service is constructing a tunnel and canal to divert 1,300 second-feet from Gunnison River into Uncompahgre River above this point.

Accuracy.—Although the channel is somewhat shifting, sufficient discharge measurements have been made to form a basis for reliable estimates.

Cooperation.—Station is maintained in cooperation with the United States Reclamation Service, by which the field data are furnished.

Discharge measurements of Uncompahgre River near Fort Crawford, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 20	Christiansen and Swett	2.10	108	July 11	E. H. Swett	3.30	400
Apr. 18	E. H. Swett	2.10	112	26	do	3.25	351
26	do	2.45	169	Aug. 23	do	3.12	348
May 15	do	2.05	110	Sept. 8	do	2.30	129
31	do	3.32	365	11	do	2.32	135
June 13	do	4.90	1,080	Oct. 3	do	3.47	485
22	do	4.30	846				

Daily gage height, in feet, of Uncompahgre River near Fort Crawford, Colo., for 1911.

[W. F. Hurlburt, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	2.50	1.75	3.30	3.40	3.25	2.08	5.00
2	2.65	1.65	3.30	3.75	3.10	2.02	4.10
3	2.55	1.55	3.35	4.30	2.55	2.06	3.80
4	2.65	1.60	3.30	4.25	2.35	2.25	3.30
5	2.43	2.10	3.85	4.05	2.45	2.22	5.00
6	2.50	3.00	4.35	4.05	2.40	2.12	5.10
7	2.35	2.45	4.30	4.10	2.45	2.22	4.60
8	2.20	2.85	4.35	3.80	2.15	2.03	3.65
9	2.15	2.95	4.65	3.65	2.10	1.88	3.50
10	2.05	2.80	4.60	3.50	2.45	2.25	3.45
11	1.80	2.20	4.70	3.35	2.60	2.16	3.35
12	1.95	2.00	4.85	3.15	2.60	2.20	3.25
13	1.87	2.10	4.60	4.45	2.75	2.15	3.15
14	1.75	....	4.90	4.60	2.43	2.18	3.05
15	1.60	2.30	3.90	4.15	2.42	2.35	2.95
16	1.77	2.20	4.05	3.75	2.40	2.30	2.85
17	2.10	2.40	3.90	3.40	2.32	2.25	2.75
18	2.10	2.45	3.90	3.45	2.35	2.35	2.80
19	2.22	2.50	4.35	4.10	2.50	2.28	2.80
20	2.50	2.20	4.30	4.10	2.40	2.25	2.70
21	2.43	2.00	4.05	3.85	2.40	2.23	2.65
22	2.54	1.95	4.25	3.80	2.55	2.30	2.60
23	2.62	1.95	4.10	3.80	3.05	2.30	2.60
24	2.32	2.40	4.20	3.25	2.60	2.29	2.50
25	2.32	3.30	4.15	2.95	2.50	2.22	2.50
26	2.50	3.05	3.85	3.05	2.32	2.15	2.55
27	2.53	2.55	3.80	3.30	2.22	2.38	2.70
28	2.65	2.40	3.85	2.95	2.18	2.55	2.50
29	2.62	2.80	3.75	2.90	2.09	2.60	2.60
30	2.00	3.20	3.40	....	2.10	3.80	2.60
31	....	3.40	....	3.60	2.10	....	2.50

Daily discharge, in second-feet, of Uncompahgre River near Fort Crawford, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	174	66	378	412	362	107	1,120
2	204	56	378	540	316	99	686
3	184	47	395	777	184	103	560
4	204	51	378	754	149	133	378
5	162	110	580	664	166	128	1,120
6	174	288	800	664	157	113	1,170
7	149	166	777	686	166	128	920
8	125	250	800	560	118	100	501
9	118	275	944	501	110	81	446
10	103	237	920	446	166	133	429
11	71	125	968	395	198	119	395
12	90	96	1,040	331	198	125	362
13	79	110	920	848	226	118	331
14	66	126	1,070	920	162	122	302
15	51	141	600	708	160	149	275
16	68	125	664	540	157	141	250
17	110	157	600	412	144	133	226
18	110	166	600	429	149	149	237
19	128	174	800	686	174	138	237
20	174	125	777	686	157	133	214
21	162	96	664	580	157	130	204
22	182	90	754	560	184	141	198
23	197	90	686	560	302	141	198
24	144	157	731	362	198	139	174
25	144	378	708	275	174	128	174
26	174	302	580	302	144	118	184
27	180	184	560	378	128	154	214
28	204	157	580	275	122	184	174
29	197	237	540	262	109	198	198
30	96	346	412	372	110	560	198
31	....	412	....	482	110	....	174

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Uncompahgre River near Fort Crawford, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	204	51	141	8,390	B.
May	412	47	172	10,600	B.
June[a]	1,070	378	687	40,900	B.
July	920	262	528	32,500	B.
August	362	109	172	10,600	B.
September	560	81	145	8,630	B.
October	1,170	174	394	24,200	B.
The period				136,000	

UNCOMPAHGRE RIVER AT MONTROSE, COLO.

Location.—At highway bridge one-fourth mile west of Montrose. Nearest important tributary, Happy Canyon Creek, enters about 2 miles below.

Records available.—April 22, 1903, to October 31, 1911.

Drainage area.—565 square miles.

Gage.—Vertical staff; location and datum unchanged.

Channel.—Extremely shifting.

Discharge measurements.—Made from the bridge.

Winter flow.—Although ice forms along the edges of the river during the winter months the river does not freeze over. Observations of gage heights are, however, discontinued during November, December, January, February, and March.

Diversions.—Uncompahgre River is so overappropriated that the United States Reclamation Service is constructing a tunnel and canal to divert 1,300 second-feet from Gunnison River into the Uncompahgre above Uncompahgre.

Accuracy.—Sufficient discharge measurements were made during 1911 to enable computation of discharges by indirect method for shifting channels; the estimates may be considered fair.

Cooperation.—Station is maintained in cooperation with the United States Reclamation Service, by which the field data are furnished.

Discharge measurements of Uncompahgre River at Montrose, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 21	Christiansen and Swett	2.95	114	July 18	E. H. Swett	3.75	292
Apr. 12	E. H. Swett	2.70	77.2	31	.....do	4.02	357
28	.....do	3.12	174	Aug. 14	.....do	3.05	124
May 17	.....do	2.50	44.3	28	.....do	2.80	73.2
19	.....do	3.00	122	Sept. 26	.....do	2.67	58.1
June 3	.....do	3.65	280	Oct. 10	.....do	3.50	370
13	.....do	5.40	922	14	.....do	3.01	234
28	.....do	4.58	469	23	.....do	2.60	147

Daily gage height, in feet, of Uncompahgre River at Montrose, Colo., for 1911.

[Alfred Reeves, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	3.30	2.38	3.30	4.00	3.15	2.47	5.95
2	....	3.35	2.30	3.52	4.60	3.55	2.42	4.80
3	....	3.34	2.37	3.60	4.80	3.75	....	4.45
4	....	3.42	2.58	3.60	4.65	3.65	....	4.08
5	....	3.23	2.97	4.50	4.80	3.58	2.82	5.64
6	....	3.15	3.45	4.60	4.65	3.10	2.70	5.55
7	....	3.05	3.35	4.60	4.65	2.65	2.68	4.35
8	....	2.99	3.30	4.80	4.40	2.40	2.52	3.90
9	....	2.90	3.23	4.75	4.10	2.40	2.35	3.68
10	....	2.84	3.03	5.10	4.20	2.80	2.50	3.49
11	....	2.64	2.50	5.00	3.85	2.96	2.47	3.22
12	....	2.61	2.27	5.30	3.70	2.92	2.44	3.14
13	....	2.54	2.33	5.15	4.45	3.05	2.59	3.08
14	....	2.35	2.20	5.30	5.30	2.92	2.68	2.99
15	....	2.26	2.46	4.65	4.25	2.72	2.91	2.92
16	....	2.27	2.29	4.70	4.25	2.55	2.78	2.82
17	....	2.69	2.43	4.50	4.00	2.45	2.70	2.78
18	....	2.66	2.40	4.05	3.80	2.37	2.70	2.76
19	....	3.07	2.55	6.20	4.55	2.35	2.70	2.76
20	....	3.15	2.45	7.30	4.70	2.54	2.72	2.72
21	2.95	3.34	2.25	5.90	4.50	2.72	2.69	2.72
22	....	3.32	2.05	6.35	4.20	2.82	2.74	2.68
23	....	3.00	2.06	6.10	4.45	3.05	2.82	2.62
24	....	2.90	2.75	5.80	4.20	2.82	2.80	2.60
25	....	2.91	3.33	5.55	3.70	2.75	2.81	2.54
26	....	3.30	3.25	4.55	3.80	2.65	2.84	2.55
27	....	3.30	2.88	4.45	3.65	2.70	2.86	2.62
28	....	3.25	2.55	4.25	3.45	2.70	2.90	2.64
29	....	3.00	3.02	3.50	3.25	2.70	3.25	2.60
30	....	2.70	3.28	2.90	3.35	2.65	4.12	2.58
31	....	....	3.35	....	4.10	2.56	....	2.54

Daily discharge, in second feet, of Uncompahgre River at Montrose, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	185	33	135	280	145	32	1,280
2	....	198	27	240	480	238	27	730
3	....	195	32	260	550	288	44	580
4	....	215	57	260	530	262	61	440
5	....	171	119	560	590	245	79	1,270
6	....	155	222	595	530	135	60	1,220
7	....	135	198	595	530	52	57	630
8	....	123	185	670	450	25	37	440
9	....	105	171	650	350	25	20	440
10	....	96	131	790	380	75	35	367
11	....	66	45	750	270	107	32	286
12	....	62	25	875	275	99	29	265
13	....	51	29	810	502	125	44	250
14	....	31	20	875	830	99	57	228
15	....	24	41	612	432	63	97	210
16	....	25	26	630	432	40	72	189
17	....	74	38	560	355	30	60	181
18	....	69	35	398	300	22	60	177
19	....	139	52	1,290	538	20	60	177
20	....	155	40	1,840	595	39	63	169
21	115	195	24	1,140	520	63	58	169
22	....	190	12	1,360	415	79	66	161
23	....	125	12	1,240	502	125	79	149
24	....	105	82	1,050	415	79	75	145
25	....	107	192	940	275	68	77	136
26	....	185	175	500	300	52	83	138
27	....	185	102	460	262	60	87	149
28	....	175	52	360	212	60	95	153
29	....	125	129	160	165	60	165	145
30	....	75	181	50	188	52	391	142
31	....	....	198	....	385	41	....	136

NOTE.—Daily discharge determined by indirect method for shifting channels. Discharge interpolated Sept. 3 and 4.

Monthly discharge of Uncompahgre River at Montrose, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	215	24	125	7,440	C.
May	222	12	86.6	5,320	C.
June	1,840	50	690	41,100	C.
July	830	165	414	25,500	C.
August	288	20	92.7	5,700	C.
September	391	27	73.4	4,370	C.
October	1,280	136	360	22,100	C.
The period				112,000	

UNCOMPAHGRE RIVER NEAR DELTA, COLO.

Location.—At highway bridge on range line between R. 95 and R. 96, 2 miles south of Delta; no tributaries between the station and the mouth, and no important tributaries for several miles upstream.

Records available.—April 29, 1903, to October 31, 1911.

Drainage area.—1,130 square miles.

Gage.—Vertical staff. The gage was originally located at a highway bridge one-fourth mile above the Denver & Rio Grande Railroad bridge. On November 17, 1903, it was moved to the railroad bridge where it was read until April 21, 1904. An inclined gage was installed near the bridge on April 21, 1904, which was used until November, 1906, when a staff gage was installed at the present site. April 16, 1910, a new gage was installed at a datum slightly different from the preceding. The relation between the gages at the various sites was not determined.

Channel.—Extremely shifting.

Discharge measurements.—Made from the bridge.

Winter flow.—The flow is probably not materially affected by ice although ice forms along the edges and slush ice frequently occurs. Observations are discontinued during the winter months.

Diversions.—The normal flow is diverted during the irrigation season by ditches above the station, so that the records represent largely return seepage water.

Accuracy.—Estimates of discharge must be rated as fair or, possibly, for certain periods, good, as sufficient measurements have not been made to give data for using the indirect method for shifting channels to the fullest extent.

Cooperation.—Station maintained in cooperation with the United States Reclamation Service, by which the field data are furnished.

Discharge measurements of Uncompahgre River near Delta, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 20	E. H. Swett	2.11	74.0	July 21	E. H. Swett	3.44	605
May 4	do	2.39	117	Aug. 3	do	2.14	147
25	do	2.30	98.0	30	do	1.71	48.8
July 7	do	3.40	392	Oct. 13	do	2.84	511

Daily gage height, in feet, of Uncompahgre River near Delta, Colo., for 1911.

[Mrs. W. J. Lance, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	2.75	2.60	2.05	2.50	2.29	1.64	4.44
2	2.95	2.15	2.00	2.95	2.24	1.64	4.29
3	2.90	2.25	2.10	3.60	2.24	1.69	3.54
4	2.75	2.50	2.25	4.25	1.94	1.74	3.29
5	2.75	2.80	2.75	3.75	1.69	1.74	4.24
6	2,85	2.80	2.95	3.60	1.64	1.74	5.34
7	2.90	3.35	3.15	3.45	1.64	1.74	4.14
8	2.60	3.50	3.10	3.50	1.54	1.74	3.44
9	2.55	3.80	3.30	3.20	1.54	1.74	3.24
10	2.40	3.50	3.35	3.25	1.52	1.74	3.19
11	2.25	3.10	3.80	2.85	1.69	1.79	3.04
12	2.10	2.75	3.65	2.50	1.66	1.74	2.94
13	2.00	2.55	3.75	2.75	1.72	1.79	2.84
14	1.90	2.50	3.80	....	1.69	1.64	2.84
15	1.90	2.50	3.60	....	1.64	2.04	2.74
16	1.80	2.30	3.35	....	1.54	2.04	2.64
17	1.75	2.20	3.25	....	1.54	2.04	2.59
18	1.75	2.25	3.00	....	1.54	2.04	2.54
19	1.80	2.30	3.40	....	1.54	2.04	2.44
20	2.15	2.30	3.70	....	1.54	2.04	2.39
21	2.40	2.25	3.75	3.54	1.59	2.04	2.34
22	2.75	2.30	4.00	3.44	1.64	2.09	2.29
23	2.95	2.30	3.90	3.64	1.89	2.39	2.29
24	2.90	2.10	3.95	3.44	1.74	2.24	2.29
25	2.50	2.35	3.95	3.19	1.74	2.24	2.24
26	2.65	2.35	3.60	3.14	1.69	2.24	2.24
27	2.75	2.20	3.35	3.14	1.59	2.34	2.29
28	3.00	2.10	3.10	2.84	1.74	2.49	2.44
29	3.00	2.10	2.85	2.54	1.74	2.69	2.34
30	2.75	2.00	2.65	2.54	1.79	3.09	2.34
31	....	2.10	....	2.34	1.74	....	2.24

Note.—Gage washed out July 14 and replaced July 21.

Daily discharge, in second-feet, of Uncompahgre River near Delta, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	192	155	62	135	187	36	1,240
2	218	78	55	245	172	36	1,170
3	230	92	70	470	172	44	810
4	192	135	92	770	95	53	660
5	192	205	192	538	44	53	1,140
6	218	205	245	470	36	53	1,740
7	230	372	275	410	36	80	1,130
8	155	430	290	490	21	80	770
9	145	560	355	370	21	80	673
10	115	430	450	390	18	80	650
11	92	290	560	255	44	90	553
12	70	192	492	195	39	80	538
13	55	145	538	260	49	90	498
14	45	135	560	310	44	60	498
15	45	135	470	360	36	150	456
16	35	100	372	410	21	150	416
17	30	85	338	460	21	150	396
18	30	92	260	510	21	150	376
19	35	100	390	560	21	150	336
20	78	100	515	610	21	150	316
21	115	92	338	653	28	150	296
22	192	100	650	608	36	190	277
23	245	100	605	698	83	290	277
24	230	70	628	608	53	240	277
25	135	108	628	501	53	240	264

Daily discharge, in second-feet, Uncompahgre River near Delta, Colo., for 1911—Contd.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
26	168	108	470	481	44	240	264
27	192	85	372	481	28	270	277
28	260	70	290	364	53	320	336
29	260	70	218	262	53	400	296
30	192	55	168	262	63	570	296
31	....	70	....	202	53	....	264

NOTE.—Daily discharge determined as follows: Apr. 1 to July 7 from a fairly well defined rating curve; July 8 to 20 and Sept. 7 to Oct. 6 by indirect method for shifting channels; July 21 to Sept. 6 and Oct. 7 to 31 from poorly defined rating curves. Discharge interpolated July 14 to 20.

Monthly discharge of Uncompahgre River near Delta, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	260	30	146	8,690	B.
May	560	55	160	9,840	B.
June	650	55	365	21,700	C.
July	770	135	430	26,400	D.
August	187	18	53.8	3,310	D.
September	570	36	158	9,400	D.
October	1,740	264	565	34,700	C.
The period	....	....	....	114,000	

CANON CREEK AT OURAY, COLO.

Location.—At Ouray, Colo., in sec. 31, T. 44 N., R. 7 W. New Mexico principal meridian, in the Uncompahgre National Forest, 200 feet above the mouth of the creek. Nearest tributary, a small stream, enters from the east some distance above.

Records available.—January 25 to December 31, 1911.

Drainage area.—26 square miles (measured on topographic sheets).

Gage.—Vertical staff.

Channel.—Shifting, after highwater.

Discharge measurements.—Made from nearby footbridge during high water, and by wading at ordinary stages.

Winter flow.—Ice causes practically no backwater at this station.

Diversions.—No water is diverted above the station.

Accuracy.—Station fairly well rated except for high stages.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Canon Creek at Ouray, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 25	O. M. Wimmer	0.21	7.9	Sept. 3	O. M. Wimmer	0.65	44.9
Mar. 20	.....do	.23	9.9	Oct. 25	.....do	.50	28.5
June 22	.....do	2.10	278	Dec. 18	H. B. Waha	.20	10.8

Daily gage height, in feet, of Canon Creek at Ouray, Colo., for 1911.

[T. J. Watkins, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	0.25	....	0.85	0.7	1.5	1.8	1.3	0.6	2.0	0.4	0.2
2	....	.2	....	.7	.7	1.5	1.9	1.3	.6	1.6	.4	.2
3	....	.2	....	.8	.6	1.5	1.8	1.3	.6	1.3	.4	.2
4	....	.25	....	.7	.7	1.8	1.7	1.2	.6	1.3	.4	.2
5	....	.1	0.2	.5	1.0	2.0	1.6	....	.6	3.9	.3	.2
6	....	.1	.2	.5	1.1	2.1	1.6	....	.5	2.2	.3	.2
7	....	.2	.2	.5	1.1	2.2	1.6	....	.5	1.7	.3	.2
8	....	.15	.2	.4	1.2	2.2	1.6	....	.5	1.5	.4	.2
9	....	.2	.2	.4	1.2	2.1	1.6	....	.5	1.5	.35	.2
10	....	.3	.2	.4	1.1	2.0	1.6	....	.5	1.3	.3	.2
11	....	.3	.2	.45	1.1	2.1	1.6	1.1	.5	1.2	.25	.2
12	....	.2	.2	.4	1.0	2.2	1.6	1.1	.5	1.1	.3	.2
13	....	.2	.2	.4	1.0	2.1	2.6	1.0	.5	1.0	.35	.2
14	....	.2	.2	.4	.9	2.1	2.0	1.0	.5	.9	.35	.2
15	....	.25	.25	.4	.9	2.0	2.0	.9	.5	.9	.3	.2
16	....	.3	.3	.4	1.0	2.0	2.0	.9	.5	.8	.3	.2
17	....	....	.25	.5	1.1	1.9	2.0	.9	.5	.8	.25	.2
18	....	....	.3	.55	1.1	1.9	2.0	.8	.5	.8	.25	.2
19	....	.2	.25	.6	1.2	1.9	2.1	.8	.5	.7	.25	.2
20	....	.2	.25	.7	1.1	1.8	2.0	.8	.5	.6	.25	.2
21	....	....	.25	.7	1.0	1.8	1.8	.8	.5	.4	.25	.15
22	....	....	.25	.8	.9	1.8	1.6	1.3	.6	.4	.2	.15
23	....	....	.25	.95	1.0	1.7	1.6	1.1	.6	.4	.2	.15
24	....	....	.25	.9	1.3	1.7	1.6	1.0	.6	.4	.2	.15
25	.2	....	.25	.8	1.2	1.8	1.6	.9	.6	.4	.2	.15
26	.2	....	.25	.8	1.3	1.7	1.5	.8	.7	.4	.2	.15
27	.2	....	.25	.9	1 2	1.8	1.5	.8	.8	.5	.2	.15
28	.2	....	.25	.9	1.3	1.6	1.4	.8	.9	.5	.2	.15
29	.25	....	.3	1.0	1.4	1.5	1.4	.7	1.1	.5	.2	.15
30	.25	....	.4	.8	1.5	1.4	1.4	.6	1.5	.4	.2	.15
31	.25	....	.7	....	1.5	....	1.3	.6	....	.4	....	.15

Daily discharge, in second-feet, of Canon Creek at Ouray, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	11	8.0	70	50	172	224	138	38	260	20	8.0
2	....	8.0	8.0	50	50	172	242	138	38	189	20	8.0
3	....	8.0	8.0	63	38	172	224	138	38	138	20	8.0
4	....	11	8.0	50	50	224	206	122	38	138	20	8.0
5	....	4.0	8.0	28	92	260	189	120	38	510	14	8.0
6	....	4.0	8.0	28	107	278	189	118	28	296	14	8.0
7	....	8.0	8.0	28	107	296	189	116	28	206	14	8.0
8	....	6.0	8.0	20	122	296	189	114	28	172	20	8.0
9	....	8.0	8.0	20	122	278	189	112	28	172	17	8.0
10	....	14	8.0	20	107	260	189	110	28	138	14	8.0
11	....	14	8.0	24	107	278	189	107	28	122	11	8.0
12	....	8.0	8.0	20	92	296	189	107	28	107	14	8.0
13	....	8.0	8.0	20	92	278	368	92	28	92	17	8.0
14	....	8.0	8.0	20	77	278	260	92	28	77	17	8.0
15	....	11	11	20	77	260	260	77	28	77	14	8.0
16	....	14	14	20	92	260	260	77	28	63	14	8.0
17	....	12	11	28	107	242	260	77	28	63	11	8.0
18	....	10	14	33	107	242	260	63	28	63	11	8.0
19	....	8.0	11	38	122	242	278	63	28	50	11	8.0
20	....	8.0	11	50	107	224	260	63	28	38	11	8.0
21	....	8.0	11	50	92	224	224	63	28	20	11	6.0
22	....	8.0	11	63	77	224	189	138	38	20	8.0	6.0
23	....	8.0	11	84	92	206	189	107	38	20	8.0	6.0
24	....	8.0	11	77	138	206	189	92	38	20	8.0	6.0
25	8.0	8.0	11	63	122	224	189	77	38	20	8.0	6.0
26	8.0	8.0	11	63	138	206	172	63	50	20	8.0	6.0
27	8.0	8.0	11	77	122	224	172	63	63	28	8.0	6.0
28	8.0	8.0	11	77	138	189	155	63	77	28	8.0	6.0
29	11	....	14	92	155	172	155	50	107	28	8.0	6.0
30	11	....	20	63	172	155	155	38	172	20	8.0	6.0
31	11	....	50	....	172	....	138	38	....	20	....	6.0

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge Jan. 1 to 24 estimated at 8 second-feet. Discharge interpolated for other days for which gage heights are missing.

Monthly discharge of Canon Creek at Ouray, Colo., for 1911.

[Drainage area, 26 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	....	....	8.29	0.319	0.37	510	C.
February	14	6.0	8.82	.339	.35	490	B.
March	50	8.0	11.5	.442	.51	707	B.
April	92	20	45.3	1.74	1.94	2,700	B.
May	172	38	105	4.04	4.66	6,460	C.
June	296	155	235	9.04	10.10	14,000	C.
July	368	138	211	8.12	9.36	13,000	C.
August	138	38	91.5	3.52	4.06	5,630	C.
September	172	28	42.0	1.62	1.81	2,500	B.
October	510	20	104	4.00	4.61	6,400	C.
November	20	8.0	12.9	.496	.55	768	B.
December	8	6.0	7.29	.280	.32	448	B.
The year	368	6.0	73.6	2.83	38.64	53,600	

DOLORES RIVER BASIN.

DOLORES RIVER AT DOLORES, COLO.

Location.—One-fourth mile southwest of the railroad station at Dolores, in Montezuma County, Colo. Nearest tributary, Lost Canon Creek, enters some distance above the station.

Records available.—August 27, 1910, to December 31, 1911.

Drainage area.—524 square miles (State engineer's report).

Gage.—Automatic recording gage.

Channel.—Probably permanent.

Discharge measurements.—Made from bridge.

Diversions.—No data.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of Dolores River at Dolores, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 11[a]	Grieve and Clayton	2.38	66	May 19	B. S. Clayton	5.70	2,690
12[a]	do	2.40	69	June 25	do	4.75	1,350
Mar. 17	B. S. Clayton	2.92	212	Aug. 28	do	2.95	240
Apr. 17	do	4.00	888	Nov. 12	do	2.69	150
May. 18	do	5.30	2,140	Dec. 12[a]	do	2.92	88

[a] Ice condition.

Daily gage height, in feet, of Dolores River at Dolores, Colo., for 1911.

[Mrs. J. I. Hughes, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	2.9	2.35	3.9	4.55	5.15	4.15	3.85	2.8	5.65	......	3.1
2	2.8	2.7	2.35	3.95	4.6	5.05	4.35	3.7	2.8	4.95	......	3.15
3	2.8	2.6	2.3	3.9	4.85	5.05	4.35	3.6	2.8	......	......	3.0
4	2.85	2.6	2.35	3.9	5.15	5.1	4.2	3.55	2.85	......	......	3.1
5	2.9	2.55	2.45	3.75	5.55	5.15	4.0	3.5	2.8	......	......	3.2
6	3.0	2.5	2.45	3.7	5.8	5.25	3.95	3.4	2.7	......	......	3.2
7	3.0	2.4	2.4	3.65	5.75	5.15	4.25	3.3	2.7	......	......	3.15
8	2.95	2.5	2.45	3.6	5.85	5.15	4.2	3.25	2.7	......	......	3.15
9	2.95	2.45	2.5	3.55	5.9	5.35	4.05	3.2	2.7	......	......	2.9
10	3.0	2.55	2.85	3.55	5.8	5.3	3.85	3.25	2.65	......	......	3.1
11	3.15	2.65	3.2	3.65	5.5	5.2	3.7	3.35	2.6	......	......	3.0
12	3.2	2.45	2.9	3.7	5.4	5.1	3.75	3.35	2.6	......	2.8	3.0
13	3.2	2.35	2.75	3.65	5.4	5.0	4.3	3.3	2.65	......	2.8	......
14	3.15	2.35	2.7	3.65	5.2	5.1	4.6	3.15	2.7	......	2.8	......
15	3.1	2.35	2.75	3.7	5.2	5.1	4.35	3.05	2.75	......	2.75	......
16	3.15	2.3	2.85	3.85	5.15	4.95	4.1	3.05	2.7	......	2.95	......
17	3.2	2.3	2.95	4.0	5.25	4.75	4.1	3.05	2.6	......	2.8	......
18	3.15	2.4	3.0	4.1	5.35	4.65	3.9	3.0	2.55	......	2.8	......
19	3.05	2.35	2.95	4.25	5.6	4.6	4.5	3.05	2.5	......	2.9	......
20	3.05	2.3	3.05	4.45	5.2	4.65	4.9	3.0	2.4	......	3.0	......
21	3.0	2.3	3.10	4.6	4.9	4.6	4.75	3.0	2.45	......	2.95	......
22	3.05	2.55	3.2	4.9	4.95	4.7	4.6	3.2	2.6	......	2.9	......
23	2.9	2.35	3.25	4.95	5.2	4.55	4.55	3.25	2.95	......	3.0	......
24	3.1	2.4	3.3	4.7	5.4	4.55	4.4	3.1	2.85	......	2.9	......
25	3.15	2.5	3.35	4.7	5.4	4.5	4.75	3.0	2.65	......	3.0	......
26	3.2	2.4	3.2	4.9	5.35	4.3	5.35	3.0	2.5	......	3.0	......
27	3.15	2.4	3.1	5.0	5.25	4.25	4.9	2.9	2.9	......	2.9	......
28	3.05	2.35	3.2	5.15	5.2	4.3	4.75	2.9	3.05	......	2.8	......
29	3.15	......	3.35	5.2	5.15	4.2	4.5	2.85	3.35	......	2.8	......
30	3.15	......	3.55	4.75	5.0	4.15	4.35	2.8	4.35	......	3.1	......
31	3.0	......	3.75	......	5.0	......	4.0	2.8	......	......	......	......

NOTE.—Gage heights affected by ice Jan. 1 to Feb. 12 and Dec. 11 to 31.

Daily discharge, in second-feet, of Dolores River at Dolores, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	80	65	74	805	1,390	2,008	895	695	180	2,095	......	180
2	80	65	74	848	1,440	1,902	1,042	605	180	1,510	......	200
3	80	65	67	805	1,690	1,902	1,042	545	180	......	......	150
4	80	65	74	805	2,008	1,955	930	515	195	......	......	150
5	80	65	92	692	2,452	2,008	795	485	180	......	......	150
6	80	65	92	655	2,740	2,115	762	430	150	......	......	125
7	80	65	82	618	2,682	2,008	968	380	150	......	......	125
8	80	65	92	580	2,798	2,008	930	358	150	......	......	100
9	80	65	102	548	2,855	2,225	828	335	150	......	......	100
10	75	65	195	548	2,740	2,170	695	358	137	......	......	100
11	75	65	340	618	2,395	2,060	605	405	124	......	......	90
12	75	70	210	655	2,280	1,955	635	405	124	......	180	88
13	75	74	165	618	2,280	1,850	1,005	380	137	......	180	......
14	75	74	150	618	2,060	1,955	1,230	312	150	......	180	......
15	75	74	165	655	2,060	1,955	1,042	270	165	......	165	......
16	70	67	195	768	2,008	1,770	860	270	150	......	230	......
17	70	67	230	890	2,115	1,540	860	270	124	......	180	......
18	70	82	250	975	2,225	1,420	730	250	113	......	180	......
19	70	74	230	1,105	2,510	1,350	1,155	270	102	......	210	......
20	70	67	270	1,292	2,060	1,380	1,470	250	82	......	250	......
21	60	67	295	1,440	1,745	1,300	1,350	250	92	......	230	......
22	60	113	340	1,745	1,798	1,380	1,230	335	124	......	210	......
23	60	74	368	1,798	2,060	1.220	1,192	358	230	......	250	......
24	60	82	395	1,540	2,280	1,200	1,080	290	195	......	210	......
25	60	102	425	1,540	2,280	1,120	1,350	250	137	......	250	......
26	60	82	340	1,745	2,225	1,005	1,840	250	102	......	250	......
27	60	82	290	1,850	2,115	968	1,470	210	210	......	210	......
28	60	74	340	2,008	2,060	1,005	1,350	210	270	......	180	......
29	60	......	425	2,060	2,008	930	1,155	195	405	......	180	......
30	60	......	548	1,590	1,850	895	1,042	180	1,042	......	180	......
31	60	......	692	......	1,850	......	795	180	......	......	......	......

NOTE.—Daily discharge estimated, because of backwater from ice, Jan. 1 to Feb. 12.

Monthly discharge of Dolores River at Dolores, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	80	60	70	4,324
February	113	65	73	4,046
March	692	67	245	15,092
April	2,060	548	1,080	64,292
May	2,855	1,390	2,163	133,014
June	2,225	895	1,619	96,315
July	1,840	605	1,043	64,131
August	695	180	339	20,818
September	1,042	82	191	11,364
October 1-2	2,095	1,510	1,800	7,150
November 12-30	250	165	206	7,745
December 1-12	200	88	130	2,090
The period				430,381

SAN MIGUEL RIVER AT PLACERVILLE, COLO.

Location.—About three-fourths of a mile below Placerville, Colo., about sec. 34, T. 44 N., R. 11 W., New Mexico principal meridian. Nearest tributary, Rio del Codo, enters at Placerville.

Records available.—September 13, 1910, to December 31, 1911.

Drainage area.—304 square miles (State engineer's report).

Gage.—Vertical staff.

Channel.—Permanent.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Diversions.—No data.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of San Miguel River at Placerville, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 13	Grieve and Clayton	0.40	61	Aug 26	B. S. Clayton	1.40	243
Mar. 16	B. S. Clayton	.48	72	Oct. 5	.....do	5.20	1,740
Apr. 15	.....do	1.00	166	Nov. 24	.....do	.67	94
May 20	.....do	2.10	513	Dec. 16[a]	M. E. Bunger	1.70	56
June 24	.....do	2.50	634				

[a] Ice conditions.

Daily gage height, in feet, of San Miguel River at Placerville, Colo., for 1911.

[John E. Stanquist, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.0	0.60	0.45	1.05	1.55	2.45	2.6	....	1.15	3.3	0.95	0.7
2	1.6	.55	.45	1.05	1.5	2.4	3.05	....	1.1	2.55	1.0	.7
3	1.6	.45	.4	1.15	1.7	2.45	2.9	....	1.15	2.1	.9	.75
4	.5	.45	.45	1.15	2.0	2.6	3.0	....	1.15	1.7	.9	.9
5	.4	.5	.5	.95	2.15	2.85	2.75	....	1.1	4.35	1.0	.9
6	.6	.5	.45	.95	2.35	3.05	2.7	....	1.0	3.95	.95	.85
7	.8	.4	.45	.9	2.4	2.9	2.75	....	1.0	2.85	.9	.85
8	.7	.4	.45	.85	2.5	3.05	2.6	....	1.0	2.35	1.0	.8
9	.6	.4	.45	.85	2.6	3.1	2.6	1.75	.95	2.15	1.0	.75
10	.6	.45	.7	.8	2.55	3.0	2.45	1.8	1.0	2.0	1.0	.8
11	.6	.45	.6	.85	2.45	3.1	2.25	1.85	1.0	1.9	.8	.7
12	.5	.45	.45	.85	2.3	3.1	2.2	1.85	1.0	1.75	.7	.7
13	.5	.45	.5	.8	2.3	3.0	3.9	1.85	1.05	1.7	1.05	.95
14	.5	.4	.5	.75	2.2	3.1	....	1.7	1.15	1.6	.9	1.45
15	.5	.4	.5	.8	2.15	2.85	....	1.65	1.15	1.55	.9	1.8
16	.6	.35	.5	.95	2.1	2.55	....	1.65	1.1	1.45	.9	2.15
17	.5	.35	.5	1.15	2.15	2.45	....	1.65	1.0	1.45	.9	1.85
18	.5	.4	.45	1.2	2.2	2.4	....	1.55	.95	1.35	.9	1.8
19	.5	.4	.45	1.4	2.5	2.55	....	1.55	.9	1.3	.9	.95
20	.5	.4	.5	1.6	2.1	2.6	....	1.55	.9	1.15	.85	.85
21	.5	.35	.55	1.8	2.1	2.65	....	1.7	.85	1.1	.85	1.2
22	.5	.4	.55	1.75	2.1	2.8	....	2.05	.85	1.15	.85	1.75
23	.45	.4	.55	1.65	2.1	2.65	....	1.8	1.05	1.15	.8	1.8
24	.45	.4	.55	1.7	2.3	2.65	....	1.7	.9	1.15	.75	2.4
25	.45	.45	.55	1.7	2.4	2.5	....	1.55	.85	1.1	.7	2.35
26	.45	.45	.45	1.7	2.4	2.5	....	1.5	1.0	1.15	.75	2.75
27	.45	.35	.55	1.9	2.2	2.6	....	1.35	1.2	1.1	.7	3.25
28	.45	.4	.65	1.8	2.25	2.8	....	1.3	1.45	1.1	.6	3.55
29	.55	....	.7	1.8	2.3	2.7	....	1.25	1.4	1.15	.65	3.65
30	.55	....	.8	1.6	2.45	2.65	....	1.2	2.35	1.0	.75	3.55
31	.45	....	.9	....	2.4	....	....	1.15	....	.95	....	3.7

NOTE.—Gage heights affected by ice Jan. 1 to 3 and Nov. 30 to Dec. 31. The gage was washed out July 14.

Daily discharge, in second-feet, of San Miguel River at Placerville, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	75	91	68	184	322	635	670	....	184	988	142	85
2	75	83	68	184	306	615	868	....	173	650	152	85
3	75	68	60	209	370	632	798	....	184	478	133	85
4	75	68	68	209	472	695	844	....	184	340	133	80
5	60	75	75	160	529	780	733	....	173	1,540	152	80
6	91	75	68	160	606	890	712	....	152	1,318	142	80
7	127	60	68	148	626	820	733	....	152	776	133	75
8	108	60	68	138	666	885	670	....	152	571	152	75
9	91	60	68	138	706	910	670	356	142	496	152	75
10	91	68	108	127	686	860	610	372	152	442	152	70
11	91	68	91	138	646	910	533	389	152	406	115	70
12	75	68	68	138	586	908	514	389	152	356	100	70
13	75	68	75	127	586	858	1,292	389	162	340	162	60
14	75	60	75	118	548	906	....	340	184	308	133	60
15	75	60	75	127	529	788	....	324	184	293	133	60
16	91	54	75	160	510	662	....	324	173	263	133	56
17	75	54	75	199	529	620	....	324	152	263	133	55
18	75	60	68	222	548	600	....	293	142	234	133	55
19	75	60	68	276	666	658	....	293	133	221	133	55
20	75	60	75	338	510	678	....	293	133	184	124	55
21	75	54	83	404	510	700	....	340	124	173	124	50
22	75	60	83	387	510	760	....	460	124	184	124	50
23	68	60	83	354	510	700	....	372	162	184	115	50
24	68	60	83	370	586	700	....	340	133	184	108	50
25	68	68	83	370	626	680	....	293	124	173	100	50
26	68	68	68	370	626	680	....	278	152	184	108	55
27	68	54	83	438	548	670	....	234	196	173	100	55
28	68	60	100	404	562	754	....	221	263	173	85	55
29	83	....	108	404	580	712	....	208	248	184	92	55
30	83	....	127	338	638	691	....	196	571	152	92	55
31	68	....	148	....	615	....	....	184	....	142	....	55

NOTE.—Daily discharge estimated, because of backwater from ice, Jan. 1 to 3 and Nov. 30 to Dec. 31.

Monthly discharge of San Miguel River at Placerville, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	127	60	78.8	4,850
February	91	54	64.4	3,580
March	148	60	81.1	4,990
April	438	118	245	14,600
May	706	306	557	34,200
June	910	600	742	44,200
July 1-13	1,292	514	742	19,100
August 9-31	460	184	314	14,300
September	571	124	177	10,500
October	1,540	142	399	24,500
November	162	85	126	7,500
December	85	50	63.4	3,900
The period				186,000

FREMONT RIVER BASIN.

FREMONT RIVER NEAR THURBER, UTAH.

Location.—At the ranch of John Smith, in sec. 6, T. 29 S., R. 4 E., Salt Lake meridian, 2 miles below the town of Thurber.

Records available.—May 13, 1909, to December 31, 1911.

Drainage area.—720 square miles.

Gage.—Vertical staff.

Channel.—Shifts during high water.

Discharge measurements.—Made by wading at low stages and from a cable and car during high stages.

Winter records.—Ice affects relation of gage height to discharge at times during the winter months.

Diversions.—Nearly all of the low-water flow of the river above Thurber is diverted and used for irrigation, most of the water in the channel at such periods being derived from springs southwest of Thurber. Mill ditch and the Torrey canal head about 500 feet below the station.

Artificial control.—The flow of the river is regulated by Johnson Reservoir (capacity, 4,800 acre-feet), which is located about 4 miles north of Fish Lake, the source of Fremont River.

Accuracy.—Records are only approximate at times, because of the shifting character of the stream bed and probable effect of backwater at gage.

Cooperation.—Maintained in cooperation with the State of Utah.

The following discharge measurement was made by J. C. Dort:

August 7, 1911: Gage height, 5.13 feet, discharge, 60.8 second-feet.

Daily gage height, in feet, of Fremont River near Thurber, Utah, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.2	5.75	5.5	6.7	5.25	4.95	4.9	5.25	5.2	5.25	5.3	5.55
2	6.0	5.7	5.5	6.9	5.25	4.95	4.95	5.3	5.2	5.25	5.3	5.4
3	5.95	5.65	5.6	6.8	5.3	4.9	4.9	5.25	5.25	5.3	5.25	5.45
4	6.05	5.65	5.8	6.85	5.35	4.85	4.85	5.25	5.25	5.3	5.25	5.4
5	5.95	5.6	5.9	5.6	5.4	4.85	4.85	5.2	5.3	5.35	5.25	5.35
6	5.55	5.6	5.9	5.6	5.4	4.9	4.8	5.2	5.8	5.3	5.3	5.4
7	5.6	5.55	5.95	5.2	5.45	4.9	4.85	5.25	5.25	5.35	5.3	5.4
8	5.7	5.5	5.9	5.0	5.45	4.95	4.8	5.25	5.25	5.3	5.3	5.35
9	5.8	5.55	5.9	5.1	5.4	4.9	4.9	5.2	5.2	5.35	5.35	5.35
10	5.9	5.5	5.85	5.0	5.45	4.85	4.95	5.2	5.2	5.35	5.35	5.4

Daily gage height, in feet, of Fremont River near Thurber, Utah, for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	5.9	5.5	5.85	5.0	5.45	4.85	5.0	5.25	5.25	5.3	5.3	5.4
12	5.85	5.6	5.9	5.0	5.45	4.9	5.0	5.3	5.25	5.3	5.35	5.35
13	5.9	5.55	5.9	4.9	5.4	4.9	5.0	5.35	5.25	5.3	5.4	5.35
14	5.95	5.55	5.95	4.95	5.45	4.95	5.05	5.35	5.3	5.25	5.4	5.3
15	5.9	5.5	5.95	4.9	5.6	4.9	5.05	5.3	5.25	5.25	5.45	5.35
16	5.85	5.5	5.95	4.9	5.6	4.85	5.1	5.25	5.3	5.3	5.4	5.4
17	5.9	5.55	5.9	4.9	5.55	4.9	5.1	5.25	5.25	5.25	5.45	5.45
18	5.85	5.6	5.9	4.95	5.5	4.95	5.15	5.2	5.25	5.25	5.4	5.4
19	5.8	5.55	5.95	4.95	5.5	4.95	5.2	5.25	5.25	5.3	5.35	5.4
20	5.75	5.5	5.9	5.0	5.5	5.0	5.1	5.25	5.3	5.3	5.4	5.35
21	5.80	5.5	5.8	5.0	5.55	5.05	5.1	5.3	5.25	5.3	5.4	5.4
22	5.65	5.6	5.85	5.0	5.5	5.1	5.05	5.3	5.2	5.25	5.45	5.4
23	5.6	5.55	5.6	5.2	5.45	5.05	5.1	5.25	5.25	5.3	5.4	5.45
24	5.8	5.5	5.6	5.2	5.4	5.05	5.15	5.25	5.3	5.25	5.45	5.4
25	5.8	5.5	5.6	5.25	5.35	5.0	5.15	5.3	5.3	5.3	5.5	5.45
26	5.85	5.5	5.65	5.25	5.35	4.9	5.2	5.25	5.35	5.3	5.55	5.5
27	5.85	5.5	5.9	5.25	5.3	4.9	5.2	5.25	5.35	5.3	5.55	5.45
28	5.85	5.55	5.9	5.25	5.2	4.95	5.25	5.2	5.4	5.25	5.6	5.5
29	5.8	....	6.1	5.25	5.15	4.9	5.2	5.2	5.4	5.25	5.55	5.55
30	5.85	....	6.2	5.2	5.1	4.95	5.25	5.25	5.35	5.3	5.5	5.6
31	5.75	....	6.7	....	5.0	....	5.25	5.25	....	5.3	....	5.55

NOTE.—Relation of gage heights to discharge probably affected by ice Jan. 1 to Feb. 19 and Nov. 24 to Dec. 31.

Daily discharge, in second-feet, of Fremont River near Thurber, Utah, for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	113	312	77	38	32	77	70	77	84
2	....	113	348	77	38	38	84	70	77	84
3	....	128	330	84	32	32	77	77	84	77
4	....	158	339	91	28	28	77	77	84	77
5	....	174	128	98	28	28	70	84	91	77
6	....	174	128	98	32	23	70	84	84	84
7	....	182	70	106	32	28	77	77	91	84
8	....	174	43	106	38	23	77	77	84	84
9	....	174	46	98	32	32	70	70	91	91
10	....	166	43	106	28	38	70	70	91	91
11	....	182	43	106	28	43	77	77	84	84
12	....	174	43	106	32	43	84	77	84	91
13	....	174	32	98	32	43	91	77	84	98
14	....	182	38	106	38	50	91	84	77	98
15	....	182	32	128	32	50	84	77	77	106
16	....	182	32	128	28	46	77	84	84	98
17	....	174	32	120	32	46	77	77	77	106
18	....	174	38	113	38	53	70	77	77	98
19	....	182	38	113	38	70	77	77	84	91
20	113	174	43	113	43	46	77	84	84	98
21	113	158	43	120	50	46	84	77	84	98
22	128	166	43	113	46	50	84	70	77	106
23	120	128	70	106	50	46	77	77	84	98
24	113	128	70	98	50	53	77	84	77	....
25	113	128	77	91	43	53	84	84	84	....
26	113	136	77	91	32	70	77	91	84	....
27	113	174	77	84	32	70	77	91	84	....
28	120	174	77	70	38	77	70	98	77	....
29	....	206	77	53	32	70	70	98	77	....
30	....	223	70	46	38	77	77	91	84	....
31	....	312	....	43	....	77	77	....	84	....

NOTE.—Daily discharge determined from a poorly defined curve. Discharge Feb. 1 to 19 estimated at 95 second-feet; discharge Nov. 24 to 30 estimated at 85 second-feet.

Monthly discharge of Fremont River near Thurber, Utah, for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			[a] 80	4,920	D.
February			102	5,660	C.
March	312	113	170	10,500	B.
April	348	32	94.6	5,630	B.
May	128	43	96.3	5,920	B.
June	50	28	35.9	2,140	C.
July	77	23	47.8	2,940	C.
August	91	70	77.7	4,780	B.
September	98	70	82.8	4,930	B.
October	91	77	82.7	5,080	B.
November			89.9	5,350	C.
December			[a] 60.0	3,690	D.
The year	348		84.7	61,600	

[a] Estimated.

MUDDY CREEK NEAR EMERY, UTAH.

Location.—At Jacobsen's ranch, about 1 mile above the boundary line of the Manti Forest Reserve, in the NE. ¼ NE. ¼ sec. 21, T. 21 S., R. 6 E., Salt Lake base and meridian.

Records available.—May 1 to July 31, 1909; July 23, 1910, to December 31, 1911.

Drainage area.—87 square miles.

Gage.—Inclined staff.

Channel.—Shifting.

Discharge measurements.—Made from cable at high water and by wading at low and medium stages.

Winter flow.—Ice affects relation of gage height to discharge for long periods during the months of December, January, and February.

Diversions.—The station is above the headgates of the Emery, Independence Co., and Lower canals, and is near a proposed reservoir site; records indicate the natural flow of the stream and the amount of water available for storage.

Accuracy.—Poor because of shifting character of the stream bed.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Muddy Creek near Emery, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 24	G. H. Canfield	1.59	19.2	Sept. 7	J. C. Dort	1.61	20.6
May 4	Leonard Tanner	2.22	90.3	7	Leonard Tanner	1.61	19.7
29	.....do	2.30	114	Oct. 9	.....do	1.95	19.2
July 21	.....do	2.10	57.3				

Daily gage height, in feet, of Muddy Creek near Emery, Utah, for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.2	1.3	2.0	2.9	2.5	2.4	2.3	1.4	....	....	....
2	1.25	1.4	1.8	2.4	2.6	2.4	2.3	1.4	....	1.6	1.4
3	1.1	1.4	1.8	2.3	2.6	2.4	2.2	1.5	....	....	....
4	1.1	1.4	1.9	3.0	2.35	2.6	2.2	1.5	....	1.6	1.4
5	1.3	1.5	1.8	3.2	2.3	2.5	2.2	1.5	....	....	....
6	1.1	1.5	1.6	3.4	2.45	2.4	2.2	1.5	....	1.6	....
7	1.3	1.6	1.5	2.4	2.2	2.4	2.2	1.5	....	....	1.4
8	1.2	1.5	1.5	2.3	2.2	2.3	2.2	1.5	2.0	1.6	....
9	1.2	1.6	1.2	2.5	2.4	2.3	2.2	1.5	2.0	....	1.4
10	1.2	1.6	1.2	3.5	2.15	2.3	2.15	1.5	2.0	1.6	....
11	1.1	1.7	1.1	2.5	2.4	2.2	2.15	1.5	2.0	1.5	....
12	1.1	1.7	1.2	2.2	2.5	2.2	2.15	1.5	1.9	1.7	1.4
13	1.3	1.8	1.0	2.3	2.6	2.2	2.1	1.5	1.9	1.6	....
14	1.3	1.9	1.0	2.3	2.5	2.2	2.1	1.5	1.9	....	1.4
15	1.2	1.9	1.0	2.6	2.5	2.2	2.1	1.5	1.8	1.6	....
16	1.1	2.0	1.0	2.3	2.7	2.2	2.1	1.5	1.8	....	1.4
17	1.1	2.0	1.6	3.2	2.4	2.3	2.2	1.5	....	....	....
18	1.1	2.2	1.7	2.4	2.5	2.2	2.0	1.5	1.8	1.7	1.4
19	1.2	2.0	1.9	2.3	2.6	3.2	2.0	1.5	1.8	....	....
20	1.2	2.0	2.0	2.5	2.4	2.5	2.0	1.5	....	1.6	....
21	1.1	1.6	2.1	2.6	2.5	2.3	4.2	1.5	1.8	....	....
22	1.2	1.5	2.4	3.3	2.6	2.5	2.0	1.5	....	1.5	1.4
23	1.2	1.6	2.5	2.6	2.5	2.4	1.6	1.5	1.8	....	....
24	1.2	1.6	2.5	2.4	2.5	2.4	1.6	1.5	1.7	....	1.4
25	1.1	1.7	2.5	3.5	2.5	2.3	1.6	1.5	....	1.5	....
26	1.3	1.8	2.4	2.6	2.5	2.3	1.5	1.5	1.7	....	....
27	1.3	1.8	1.8	2.5	2.5	2.2	1.5	....	....	1.5	1.4
28	1.3	2.0	2.6	3.2	2.45	3.7	1.5	....	1.7	....	....
29	....	2.1	2.7	2.3	2.4	2.6	1.5	....	1.7	1.5	....
30	....	2.1	2.8	3.2	2.4	2.4	1.5	....	....	....	1.4
31	....	2.3	....	2.5	....	2.3	1.4	....	1.7	....	....

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to 27 and during December.

Daily discharge, in second-feet, of Muddy Creek near Emery, Utah, for 1911.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	3.0	6.0	61	209	141	118	89	15	20	6
2	4.5	10	37	124	158	118	89	15	20	4
3	1.0	10	37	108	158	118	73	20	20	4
4	1.0	10	48	226	116	137	73	20	20	4
5	6.0	15	37	260	108	121	73	20	20	4
6	1.0	15	21	294	132	105	73	20	20	4
7	6.0	21	15	124	92	105	73	20	20	4
8	3.0	15	15	108	92	89	73	20	22	4
9	3.0	21	3.0	141	124	89	73	20	22	4
10	3.0	21	3.0	311	84	89	66	20	22	4
11	1.0	28	1.0	141	124	73	66	20	22	2
12	1.0	28	3.0	92	141	73	66	20	16	7
13	6.0	37	.0	108	158	73	58	20	16	4
14	6.0	48	.0	108	141	73	58	20	16	4
15	3.0	48	.0	158	141	73	58	20	11	4
26	1.0	61	.0	108	175	73	58	20	11	5
17	1.0	61	21	260	124	89	73	20	11	6
18	1.0	92	28	124	134	73	45	20	11	7
19	3.0	61	48	108	150	234	45	20	11	6
20	3.0	61	61	141	118	121	45	20	11	4
21	1.0	21	76	158	134	89	404	20	11	3
22	3.0	15	124	277	150	121	73	20	11	2
23	3.0	21	141	158	134	105	28	20	11	2
24	3.0	21	141	124	134	105	28	20	7	2
25	1.0	28	141	311	134	89	28	20	7	2
26	6.0	37	124	158	134	89	20	20	7	2
27	6.0	37	37	141	134	73	20	20	7	2
28	6.0	61	158	260	126	319	20	20	7	2
29	....	76	175	108	118	137	20	20	7	2
30	....	76	192	260	118	105	20	20	7	2
31	....	108	....	141	....	89	15	....	7	....

NOTE.—Daily discharge determined from a curve fairly well defined for all stages. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Muddy Creek near Emery, Utah, for 1911.

[Drainage area, 87 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a]2	0.023	0.03	123	D.
February	6.0	1.0	3.1	.036	.04	172	D.
March	108	6.0	37.7	.438	.50	2,320	D.
April	192	.0	58.3	.671	.75	3,470	D.
May	311	92	172	1.98	2.28	10,600	D.
June	175	92	131	1.51	1.68	7,800	D.
July	319	73	109	1.25	1.44	6,700	D.
August	404	15	64.6	.743	.86	3,970	D.
September	20	15	19.7	.226	.25	1,170	D.
October	22	7	13.9	.159	.18	855	D.
November	7	2	3.7	.043	.05	220	D.
December			[a]2	.023	.03	123	D.
The year	404	0	51.8	.595	8.09	37,500	

[a] Estimated.

MUDDY CREEK (LOWER STATION) NEAR EMERY, UTAH.

Location.—At the county bridge about 2½ miles north of Emery, Utah, in the NE. ¼ sec. 35, T. 21 S., R. 6 E., Salt Lake base and meridian.

Records available.—June 6, 1911, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain gage attached to the highway bridge.

Channel.—Shifting.

Discharge measurements.—At high stages, made from the bridge; at other stages by wading.

Winter flow.—Ice affects the relation of gage height to discharge during the winter months.

Diversions.—Below all diversions except a few small ditches.

Accuracy.—Poor.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Muddy Creek (lower station) near Emery, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 6	Leonard Tanner	2.55	74.8	Sept. 9	Leonard Tanner	1.49	2.99
July 21	do	1.58	2.6	Oct. 10	do	1.68	3.47
Sept. 9	J. C. Dort	1.49	2.8				

Daily gage height, in feet, of Muddy Creek (lower station) near Emery, Utah, for 1911.

[R. Jacobsen, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.0	1.2	1.3	1.6		
2		1.4	1.2	1.45	1.75	1.5	1.3
3		2.7	1.2	1.3	1.6		
4		2.4	1.35	1.3	1.6	1.5	1.4
5		2.55	1.2	1.3	1.6		
6	2.48	2.5		1.3	1.7	1.4	
7	2.15	1.4		1.45	1.85		1.4
8	2.2	1.4		1.3	1.7	1.4	
9	2.15	1.2		1.3	1.7		1.4
10	2.3	1.35		1.3	1.7	1.4	

Daily gage height, in feet, of Muddy Creek (lower station) near Emery, Utah, for 1911—Continued.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	2.15	1.2	2.1	1.3	1.6	1.4	
12	2.1	1.2		1.45	1.6	1.5	
13	2.1	1.2		1.3	1.6	1.5	
14	2.15	1.2		1.2	1.6		1.4
15	2.25	1.35		1.2	1.6	1.5	
16	2.1	1.2		1.2	1.5		1.4
17	2.15	1.2					
18		1.2			1.5	1.5	1.4
19		1.2			1.5		
20		1.7				1.5	
21		1.45	3.5		1.5		
22		1.45	1.6			1.5	1.4
23	2.1	1.4	1.75		1.5		
24	2.1	1.35	1.6		1.4		1.4
25	2.25	1.45	1.6			1.4	
26	2.1	1.3	1.6		1.4		
27	2.1	1.4	1.5	1.55		1.5	1.4
28	2.1	2.7	1.65	1.5	1.4		
29	2.1	1.6	1.5	1.6	1.5	1.4	
30	2.15	1.35	1.4	1.4			1.3
31		1.2	1.4		1.5		

Note.—Relation of gage height to discharge probably affected by ice during last of November and all of December.

Daily discharge, in second-feet, of Muddy Creek (lower station) near Emery, Utah, for 1911.

Day.	June.	July.	Aug.	Sept.
1		27	2	3.0
2		4	2	4.5
3		102	2	3.0
4		62	3.5	3.0
5		80	2	3.0
6	72	74	2	3.0
7	39	4	2	4.5
8	43	4	4	3.0
9	39	2	8	3.0
10	52	3.5	12	3.0
11	39	2	35	2.5
12	35	2	16	3.0
13	35	2	6	2.5
14	39	2	4	2.0
15	48	3.5	6	2.0
16	35	2	2	2.0
17	39	2	2	2.0
18	38	2	4	2.0
19	38	2	15	2.0
20	37	10	20	2.0
21	36	4.5	262	2.0
22	36	4.5	6	3.0
23	35	4	12	3.0
24	35	3.5	6	4.0
25	48	4.5	5.5	4.0
26	35	3	5.0	3.5
27	35	4	5.0	3.5
28	35	102	6.0	3.5
29	35	6	5.0	4.0
30	39	3.5	4.0	3.0
31		2	3.5	

Note.—Daily discharge determined from a poorly defined curve applicable June 6 to Aug. 23; indirect method for shifting channels used for period Aug. 2 to Sept. 30. Discharge estimated for days for which no gage heights are given.

Monthly discharge of Muddy Creek (lower station) near Emery, Utah, for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 6–30	72	35	39.5	1,960	C.
July	102	2	17.2	1,060	C.
August	262		15.1	928	D.
September			3.0	178	D.
October			[a] 3.5	215	D.
November			[a] 3.5	208	D.
December			[a] 2.0	123	D.
The period				4,670	

[a] Estimated because of unstable conditions at low water.

IVIE CREEK NEAR EMERY, UTAH.

Location.—In sec. 5 or 6, T. 24 S., R. 5 E., Salt Lake base and meridian, about 1½ miles from Oak Spring ranch, 15 miles southwest of Emery and 3 miles below the confluence of Red Creek and Clear Creek.

Records available.—May 3 to December 31, 1911.

Drainage area.—Not accurately known.

Gage.—Vertical staff on left bank.

Channel.—Shifting.

Discharge measurements.—Made by wading about 50 feet below the gage.

Winter flow.—Ice affects the relation of gage height to discharge during January and February; at times the creek is frozen to the bottom.

Diversions.—Oak Spring ranch ditch, 1½ miles above the gage, diverts practically all the flow of Ivie Creek except during two or three weeks of high water in the spring and occasional periods of short floods.

Accuracy.—Measurements and gage heights insufficient for estimates of discharge.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Ivie Creek near Emery, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 3	Leonard Tanner	1.6	10.7	Sept. 8	J. C. Dort	1.70	[a] .04

[a] Estimated.

Daily gage height, in feet, of Ivie Creek near Emery, Utah, for 1911.

[B. W. Harmon, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1							
2	1.85						
3	1.6	1.5					
4	1.65						
5							
6	1.75						
7							
8	1.8						
9							
10	1.6						

Daily gage height, in feet, of Ivie Creek near Emery, Utah, for 1911—Continued.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11				6.8		2.1	
12	1.6			1.4			
13	1.5			4.7			
14	1.5	1.8					
15							
16	1.5	1.75					
17							
18	1.5	1.5					3.0
19		2.1	4.0				2.8
20	1.5	1.7	1.5				
21		4.3					
22	1.5	3.0					
23		1.8					
24	1.5	1.5			1.6		
25							
26							
27	1.5						
28			2.4				
29			1.4		3.9		
30							
31							

ESCALANTE RIVER BASIN.

ESCALANTE CREEK NEAR ESCALANTE, UTAH.

Location.—About 2 miles below the town of Escalante, Utah, in sec. 9, T. 35 S., R. 3 E. Salt Lake meridian; just below the mouth of Winslow or Pine Creek.

Records available.—August 5, 1909, to December 31, 1911.

Drainage area.—315 square miles.

Gage.—Vertical staff.

Channel.—Shifts during the sudden short flooods to which the stream is subject.

Discharge measurements.—Made from car and cable or by wading.

Winter flow.—Ice affects the relation of gage height to discharge at times during the winter months.

Diversions.—All of the low-water flow is used for irrigation above the station; the records at this point show the amount of unappropriated and waste waters.

Accuracy.—Poor owing to shifting character of stream bed and lack of discharge measurements. Yearly total is probably correct within an accurary of C, but daily and monthly discharge during certain periods is apt to be in error to a greater amount than this.

Cooperation.—Maintained in cooperation with the State of Utah.

The following discharge measurement was made by J. C. Dort:
August 10, 1911: Gage height, 2.42 feet; discharge, 10.85 second-feet.

Daily gage height, in feet, of Escalante Creek near Escalante, Utah, for 1911.

[D. C. Schurtz, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	2.5		2.5							2.5	
2			2.65		2.55			2.1	3.0	2.3		2.45
3	3.6	2.7		2.45			2.15					
4			2.65		2.6				2.3	2.2	2.5	2.4
5	3.6	2.55		2.5		2.4	2.05	2.1			2.5	
6			2.6		2.6				2.4			2.3
7	3.6	2.5		2.5						2.2		
8			4.3		2.55	2.3	2.15	2.35				
9	3.6	2.45							2.45	2.6	2.4	2.9
10	3.0		3.5	2.35	2.8	2.3	2.1	2.4				

Daily gage height, in feet, of Escalante Creek near Escalante, Utah, for 1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	3.0	2.45	......	......	......	......	......	......	2.2	......	2.3	......
12	......	......	2.7	2.4	2.6	2.1	2.05	4.4	......	......	......	2.6
13	2.65	......	......	......	......	......	......	......	......	......	2.4	......
14	......	2.5	2.6	2.4	2.55	2.5	......	2.4	2.1	......	......	......
15	2.7	......	......	......	......	......	2.15	......	......	......	2.55	2.7
16	......	2.55	2.5	2.35	2.5	......	......	2.45	2.1	......	......	2.9
17	2.6	......	......	2.4	......	2.55	2.05	3.2	......	......	......	2.6
18	......	2.6	2.5	......	2.5	......	......	......	2.3	......	2.6	......
19	......	......	......	2.35	......	2.20	2.0	3.4	......	......	2.4	2.9
20	2.55	2.55	2.55	......	2.45	......	......	......	2.35	......	......	......
21	......	......	2.7	2.35	......	2.1	......	2.55	......	......	......	......
22	2.65	2.45	......	......	2.45	......	7.55	......	......	......	2.35	......
23	......	......	2.65	2.4	......	......	......	......	2.25	......	......	2.9
24	2.55	2.5	......	......	2.4	2.05	5.9	5.3	......	......	......	......
25	4.1	......	2.6	2.35	......	......	7.3	......	......	2.4	2.4	......
26	......	2.55	......	......	2.3	2.05	4.1	2.6	......	......	2.9	2.9
27	2.75	......	2.5	1.8	......	......	......	......	3.0	......	......	......
28	......	2.6	......	......	......	2.0	......	......	3.2	6.2	......	2.8
29	3.5	......	2.5	1.8	2.3	......	6.2	2.6	3.2	......	2.4	......
30	2.8	......	......	1.8	......	2.05	......	......	7.0	2.55	......	2.8
31	......	......	2.5	......	2.2	......	2.2	2.4	......	......	......	......

Daily discharge, in second-feet, of Escalante Creek near Escalante, Utah, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	25	34	25	28	15	9	5	27	8	15	12
2	......	31	34	23	28	16	11	4	43	8	15	13
3	......	37	34	22	29	17	12	4	26	7	15	12
4	......	32	34	23	31	18	11	4	8	6	15	11
5	......	28	32	25	31	20	10	4	9	6	15	9
6	......	26	31	25	31	19	11	6	11	6	14	8
7	......	25	31	25	30	18	12	8	12	6	13	16
8	......	23	240	22	28	17	12	10	12	12	12	24
9	......	22	178	20	36	17	12	10	13	19	11	36
10	......	22	115	18	44	17	11	11	9	15	10	31
11	......	22	37	20	38	14	10	11	6	15	8	25
12	......	23	37	20	31	11	10	218	5	15	10	19
13	34	24	34	20	30	18	11	11	4	15	11	21
14	35	25	31	20	28	25	11	11	4	15	14	23
15	37	26	28	19	26	26	12	12	4	15	17	24
16	34	28	25	18	25	27	10	13	4	15	18	20
17	31	30	25	20	25	28	10	59	6	15	18	19
18	30	31	25	20	25	21	9	68	8	15	19	......
19	29	30	26	18	24	14	8	78	9	15	11	......
20	28	28	28	18	22	13	8	48	10	15	10	......
21	31	25	37	18	22	11	8	17	9	15	10	......
22	34	22	36	19	22	10	810	17	8	15	10	......
23	31	24	34	20	21	10	655	17	7	15	10	......
24	28	25	34	20	20	10	500	388	16	15	11	......
25	30	26	31	18	18	10	760	19	25	11	11	......
26	35	28	28	18	17	10	168	19	34	11	36	......
27	40	30	25	44	17	9	200	19	43	11	27	......
28	41	31	25	44	17	8	400	19	59	557	19	30
29	43	......	25	44	17	8	557	19	59	17	11	30
30	44	......	25	44	16	8	6	15	710	17	11	30
31	35	......	25	......	14	......	6	11	......	16	......	30

NOTE.—Daily discharge determined from a number of poorly defined rating curves and by the indirect method for shifting channels. Mean discharge Jan. 1-12 and Dec. 18-27 estimated 25 second-feet. Discharge estimated for days when gage was not read.

Monthly discharge of Escalante Creek near Escalante, Utah, for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	....	....	30.6	1,880
February	37	22	26.8	1,490
March	240	25	44.6	2,740
April	44	18	23.7	1,410
May	44	14	25.5	1,570
June	28	8	15.5	922
July	810	6	138	8,480
August	388	4	37.3	2,290
September	710	4	40.0	2,380
October	557	6	30.4	1,870
November	36	8	14.2	845
December	36	8	22.4	1,380
The year	810	4	37.7	27,300

NOTE.—For accuracy notes see description.

SAN JUAN RIVER BASIN.

SAN JUAN RIVER AT PAGOSA SPRINGS, COLO.

Location.—At Pagosa Springs, in sec. 13, T. 35 N., R. 2 W. New Mexico principal meridian. Nearest tributary is a stream that enters from the north a mile below.

Records available.—January 24 to December 31, 1911.

Drainage area.—287 square miles (measured from Forest atlas).

Gage.—Vertical staff. The gage was originally located at a highway bridge above Pagosa Springs. On March 7, 1911, the gage was moved half a mile downstream. It was washed out by a flood October 5 and a new gage installed November 23 100 yards below the new highway bridge. The relation between the different gages is not known.

Channel.—Apparently permanent.

Discharge measurements.—Made from near-by bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater at this station.

Diversions.—Small irrigation ditches divert water above the station. Between sec. 17, T. 37 N., R. 1 E., and sec. 28, T. 36 N., R. 2 W., there are seven ditches averaging 2 feet wide on top, 1½ feet on bottom, and 1½ feet deep. There are court decrees for diversions of 20 second-feet above the station and 175 second-feet from tributaries entering above.

Accuracy.—As the station has not yet been completely rated, estimates of discharge can not be presented.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of San Juan River at Pagosa Springs, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 29[a]	O. M. Wimmer	1.23	98.0	Aug. 31	O. M. Wimmer	[b]1.65	321
June 25	do	[b]3.60	1,670	Nov. 23	H. B. Waha	[c]2.10	208

[a] Ice conditions. [b] To datum of second gage. [c] Third-gage datum.

Daily gage height, in feet, of San Juan River at Pagosa Springs, Colo., for 1911.

[R. W. Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	......	0.70	2.45	2.70	4.05	3.70	2.20	1.60	3.50	......	1.85
2	......	......	.80	......	2.75	4.25	5.20	2.15	1.50	3.00	......	1.85
3	......	......	.79	......	2.85	4.25	4.35	2.05	1.48	2.62	......	2.05
4	......	......	.70	......	3.15	4.25	4.15	1.95	1.45	2.45	......	1.85
5	......	......	......	......	3.58	4.35	4.05	1.80	1.40	......	......	1.85
6	......	......	1.00	2.38	4.10	4.45	3.50	1.80	1.40	......	......	1.85
7	......	......	.98	2.30	4.18	4.40	3.25	1.70	1.40	......	......	1.92
8	......	......	1.09	2.20	4.55	4.90	3.15	1.65	1.35	......	......	1.82
9	......	......	1.07	2.10	4.60	4.95	3.00	1.60	1.35	......	......	1.85
10	......	1.10	1.28	2.05	4.25	4.60	2.85	1.55	1.35	......	......	......
11	......	......	1.64	2.10	3.75	4.45	2.80	1.55	1.30	......	......	1.80
12	......	......	1.35	2.18	3.80	4.35	2.70	1.55	1.28	......	......	1.50
13	......	......	1.25	2.12	3.65	4.30	3.00	1.50	1.25	......	......	1.75
14	......	......	1.28	2.25	3.40	4.22	3.15	1.50	1.20	......	......	1.38
15	......	......	1.32	2.30	3.55	4.10	2.90	1.45	1.45	......	......	1.42
16	......	......	1.38	2.50	3.55	4.00	2.85	1.40	1.30	......	......	1.50
17	......	......	1.42	2.60	3.65	3.65	2.80	1.40	1.25	......	......	......
18	......	......	1.50	2.35	3.80	3.45	2.65	1.40	1.20	......	......	1.70
19	......	.70	1.60	2.55	3.90	3.70	3.00	1.45	1.40	......	......	1.70
20	......	.80	1.60	2.80	3.65	3.80	3.50	1.40	1.60	......	......	1.65
21	......	.71	1.58	3.15	3.80	4.20	3.40	1.90	1.45	......	......	......
22	......	.70	1.65	3.20	3.32	4.15	3.10	2.65	1.40	......	......	1.50
23	......	1.70	1.60	3.20	3.55	3.95	3.10	2.35	1.38	......	2.10	......
24	......	1.60	1.68	3.10	3.78	3.75	3.15	2.20	1.32	......	1.70	......
25	......	......	1.82	2.95	3.90	3.50	3.00	2.00	1.25	......	1.88	......
26	......	......	......	3.12	3.78	3.25	2.85	1.80	2.13	......	1.80	1.50
27	......	......	1.68	3.35	3.70	3.25	2.70	2.00	1.72	......	1.78	1.45
28	......	......	1.88	3.25	3.70	3.25	2.75	1.90	1.60	......	1.58	1.45
29	1.55	......	2.08	3.28	3.65	3.20	2.65	1.75	1.60	......	1.60	1.45
30	1.70	......	2.30	2.80	3.65	3.80	2.45	1.70	2.90	......	1.90	1.80
31	1.55	......	2.50	......	3.85	......	2.35	1.65	......	......	......	......

NOTE.—Ice present Jan. 29 to Feb. 24 and Nov. 23 to Dec. 30. Gage heights Jan. 29 to Mar. 7 read on gage No. 1. Mar. 8 to Oct. 5 gage No. 2 was read; gage heights Nov. 23 to Dec. 31 were read on the third gage. The three gages are independent and bear no relation to each other.

SAN JUAN RIVER AT ARBOLES, COLO.

Location.—At Arboles, Colo., above Piedra River.

Records available.—August 21, 1910, to December 31, 1911.

Drainage area.—1,394 square miles.

Gage.—Inclined staff.

Channel.—Probably permanent.

Discharge measurements.—Made from car and cable.

Winter flow.—No data.

Diversions.—There are court decrees for the diversion of 23 second-feet between Arboles and the station at Pagosa Springs, and 61 second-feet from intervening tributaries.

Flood discharge.—Two severe floods have occurred on the San Juan since the station has been maintained. The maximum stage of the flood of September 6, 1909, although very high, was less than that of October 1, 1911, when the river rose 17 feet, with a maximum discharge of about 40,000 second-feet.

Cooperation.—Station maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of San Juan River at Arboles, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 21	Clayton and Turner..	1.40	182	May 26	B. S. Clayton........	3.94	3,040
Mar. 25	B. S. Clayton........	2.83	1,570	July 1	.....do...............	4.50	3,590
Apr. 24	.....do...............	3.72	2,580	Sept. 1	.....do...............	1.91	494
May 17	.....do...............	4.10	3,300	Dec. 18[a]	.....do...............	.60	267

[a] Ice conditions.

Daily gage height, in feet, of San Juan River at Arboles, Colo., for 1911.

[L. E. Smack, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.2	1.8	1.5	3.55	3.5	4.05	4.85	2.7	2.0	1.75	1.75	1.95
2	1.2	1.95	1.55	3.75	3.25	4.6	5.8	2.5	2.0	2.3	1.7	1.95
3	1.15	1.9	1.7	3.6	3.3	4.65	4.7	2.5	1.95	3.05	1.65	2.0
4	1.1	1.9	2.0	3.5	3.5	4.6	4.4	2.35	1.9	4.75	1.7	2.0
5	1.1	1.95	3.0	3.55	4.0	4.7	4.1	2.25	1.9	16.0	1.7	1.9
6	1.15	1.85	3.55	3.0	4.3	4.7	3.95	2.1	1.9	12.0	1.75	1.9
7	1.2	1.85	3.2	2.85	4.7	4.65	3.65	2.0	1.8	7.0	1.75	1.9
8	1.45	1.8	3.0	2.7	4.9	4.7	3.4	2.0	1.8	5.1	1.95	1.95
9	......	1.75	2.75	2.5	5.0	5.2	3.2	2.0	1.8	4.45	1.95	2.0
10	......	1.7	3.1	2.55	4.8	4.95	3.05	2.0	1.8	4.0	1.9	2.0
11	......	1.7	3.5	2.55	4.6	4.7	3.05	2.0	1.8	3.45	1.85	1.9
12	......	1.7	3.2	2.8	4.3	4.5	3.2	2.0	1.8	3.0	1.8	1.8
13	......	1.7	2.65	2.75	4.05	4.5	3.0	1.95	1.9	3.0	1.8	1.8
14	......	1.7	2.6	2.55	3.9	4.45	4.0	1.95	1.9	3.0	1.8	1.75
15	......	1.65	2.6	2.65	3.6	4.4	4.15	1.9	1.8	2.55	1.85	1.7
16	......	1.65	2.95	2.8	3.8	4.55	3.9	1.85	1.7	2.55	1.95	1.7
17	......	1.7	3.0	2.9	4.05	4.55	3.4	1.9	1.7	2.5	2.0	1.7
18	......	1.4	2.95	2.9	4.1	4.5	4.1	1.8	1.6	2.55	2.0	......
19	......	1.4	3.0	2.95	4.3	3.9	4.3	1.8	1.6	2.35	2.05	......
20	1.6	1.4	2.85	2.8	4.0	4.1	3.55	1.85	3.15	2.35	1.95	......
21	1.6	1.35	3.0	3.35	3.55	4.35	5.25	1.85	2.0	2.5	1.85	......
22	1.55	1.3	2.95	3.75	3.55	4.4	4.4	2.75	1.9	2.85	1.85	......
23	1.6	1.3	2.75	3.55	3.75	4.45	3.85	3.85	1.8	2.85	1.8	......
24	1.65	1.3	2.55	3.65	3.9	4.4	3.5	3.2	1.7	2.55	1.7	......
25	1.65	1.4	2.7	3.55	4.15	4.1	3.6	2.5	1.7	2.5	1.7	......
26	1.7	1.4	2.85	3.7	4.05	3.9	3.45	2.55	3.7	2.5	1.65	......
27	1.7	1.4	2.6	3.9	4.0	3.65	3.4	2.5	3.0	2.45	1.7	......
28	1.65	1.5	2.65	3.75	3.95	3.6	3.25	2.45	2.0	2.45	1.7	......
29	1.6	......	2.7	3.8	3.75	3.55	3.25	2.55	3.75	2.35	1.65	......
30	1.6	......	2.9	3.6	3.85	3.7	3.1	2.35	4.0	2.4	1.5	......
31	1.7	......	3.2	......	3.85	......	2.9	2.0	......	2.2	......	......

NOTE.—Ice present Jan. 1 to Feb. 17 and Dec. 1 to 31.

Daily discharge, in second-feet, of San Juan River at Arboles, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	100	125	230	2,450	2,380	3,195	4,140	1,310	580	385	727	550
2	100	125	260	2,745	2,030	4,050	5,880	1,080	580	870	695	550
3	100	125	350	2,520	2,240	4,130	4,210	1,080	535	1,755	685	500
4	100	125	580	2,380	2,380	4,050	3,730	920	490	4,290	695	450
5	100	125	1,690	2,450	3,120	4,210	3,270	820	490	25,000	695	450
6	100	125	2,450	1,690	3,570	4,210	3,045	670	490	11,300	727	400
7	100	125	1,960	1,495	4,210	4,130	2,595	580	420	5,800	727	400
8	100	135	1,690	1,310	4,530	4,210	2,240	580	420	3,710	865	350
9	125	135	1,370	1,080	4,690	5,030	1,960	580	420	3,055	865	350
10	125	150	1,820	1,135	4,370	4,610	1,755	580	420	2,655	830	300
11	125	150	2,380	1,135	4,050	4,210	1,755	580	420	2,095	795	300
12	125	150	1,960	1,430	3,570	3,890	1,960	580	420	1,695	760	300
13	125	150	1,250	1,370	3,195	3,890	1,690	535	490	1,695	760	270
14	125	150	1,190	1,135	2,970	3,810	3,120	535	490	1,695	760	270
15	125	150	1,190	1,250	2,520	3,730	3,345	490	420	1,320	795	270

Daily discharge, in second-feet, of San Juan River at Arboles, Colo., for 1911—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	125	150	1,625	1,430	2,820	3,970	2,970	455	350	1,320	865	267
17	125	150	1,690	1,560	3,195	3,970	2,240	490	350	1,280	900	267
18	125	180	1,625	1,560	3,270	3,890	3,270	420	290	1,320	900	267
19	125	180	1,690	1,625	3,570	2,970	3,570	420	290	1,160	935	267
20	135	180	1,495	1,430	3,120	3,270	2,450	455	1,890	1,160	865	267
21	135	160	1,690	2,170	2,450	3,650	5,115	455	580	1,280	795	267
22	135	140	1,625	2,745	2,450	3,730	3,730	1,370	490	1,568	795	267
23	135	140	1,370	2,450	2,745	3,810	2,895	2,895	420	1,568	760	267
24	135	140	1,135	2,595	2,970	3,680	2,380	1,960	350	1,320	695	267
25	135	180	1,310	2,450	3,345	3,260	2,520	1,080	350	1,280	695	267
26	135	180	1,495	2,670	3,195	2,840	2,310	1,135	2,670	1,280	665	267
27	135	180	1,190	2,970	3,120	2,450	2,240	1,080	1,690	1,240	695	267
28	125	230	1,250	2,745	3,045	2,350	2,030	1,025	580	1,240	695	267
29	125	....	1,310	2,820	2,745	2,250	2,030	1,135	2,740	1,160	665	267
30	125	....	1,560	2,520	2,895	2,430	1,820	920	3,120	1,200	575	267
31	125	....	1,960	....	2,895	....	1,560	580	....	1,045	....	267

NOTE.—Discharge Jan. 1 to 19 estimated; discharge for December estimated from discharge measurement. Discharge estimated Oct. 5, only approximate.

Monthly discharge of San Juan River at Arboles, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	135	100	121	7,448
February	230	125	151	8,400
March	2,450	230	1,432	88,046
April	2,970	1,080	1,977	117,650
May	4,690	2,030	3,150	193,696
June	5,030	2,250	3,662	217,934
July	5,880	1,560	2,833	174,198
August	2,895	420	864	53,147
September	3,120	290	775	46,116
October	25,000	385	2,827	173,955
November	935	575	762	45,337
December	550	267	322	19,879
The year	25,000	100	1,583	1,145,741

SAN JUAN RIVER NEAR BLOOMFIELD, N. NEX.

Location.—At suspension bridge, 1½ miles below Bloomfield, N. Mex., in T. 29 N., R. 11 W., New Mexico principal meridian. Nearest tributary, Canyon Largo, enters 10 miles above.

Records available.—September 28, 1909, to October 3, 1911. From December 9, 1908, to October 31, 1910, a station was maintained at Blanco, 11 miles upstream. The records at Bloomfield and Blanco are very nearly comparable, as the only intervening tributary is Canyon Largo, and this carries water only during a small portion of the year.

Drainage area.—5,190 square miles (measured from Land Office map).

Gage.—Automatic recording gage installed February 11, 1910, which was washed out July 22, 1911, replaced August 12, 1911, about 150 feet below its former location, and again washed out October 4, 1911. The original gage was of the wire type, attached to the bridge and referred to the same datum.

Channel.—Very shifting.

Discharge measurements.—Made from suspension bridge.

Diversions.—Considerable water diverted for irrigation above the station.

Winter flow.—Ice causes some backwater during the winter months.

Floods.—On October 6, 1911, the river reached a stage of 12 feet, which was the highest reached sice the station was established. It is estimated that the flow was about 80,000 second-feet at the maximum stage. A flood stage was reached September 8, 1909, but it was not of such magnitude as that of October 6, 1911.

Accuracy.—On account of the shifting of the channel the estimates have been prepared by the indirect method, and can not be considered better than fair.

Cooperation.—Station maintained in cooperation with the Territorial engineer.

Discharge measurements of San Juan River near Bloomfield, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 24	G. H. Russell........	3.05	402	May 30	J. B. Stewart........	4.90	6,370
Feb. 23	.....do..............	3.03	395	Aug. 11	W. B. Freeman......	4.10	1,110
Apr. 7	E. O. Christiansen...	5.12	4,740	12	.....do..............	4.30	1,120

Daily gage height, in feet, of San Juan River near Bloomfield, N. Mex., for 1911.

[S. P. Walton, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	3.15	3.5	3.3	5.4	4.6	5.25	5.6	4.6	4.8	6.0
2	3.15	3.6	3.3	5.3	4.55	5.6	6.7	4.5	4.7	....
3	3.15	3.45	3.35	5.2	4.65	5.55	6.5	4.5	4.5	5.35
4	3.2	3.3	3.45	5.2	4.8	5.55	5.95	4.4	4.55	....
5	3.2	3.3	4.05	5.3	5.15	5.65	5.3	4.3	4.65	....
6	3.2	3.3	5.75	5.0	5.5	5.7	4.65	....	4.6	....
7	3.6	3.15	5.4	5.1	5.9	5.6	4.4	....	4.55	....
8	3.9	3.05	4.5	4.9	5.9	5.6	4.3	....	4.55	....
9	3.95	3.05	4.5	4.7	6.25	5.9	4.05	4.3	4.55	....
10	4.05	3.1	4.7	4.7	6.25	6.0	3.8	4.1	4.55	....
11	5.2	3.05	5.45	4.6	5.8	5.75	3.7	4.1	4.55	....
12	5.35	3.05	4.6	4.7	5.55	5.65	4.1	4.5	4.45	....
13	4.35	3.15	3.95	4.7	5.45	5.5	5.9	4.5	4.4	....
14	4.55	3.15	3.85	4.5	5.35	5.5	6.4	4.65	4.55	....
15	3.8	3.1	3.9	4.4	5.3	5.45	4.3	4.65	4.65	....
16	3.7	3.15	4.15	4.6	5.35	5.3	4.8	4.5	4.6	....
17	4.4	3.1	4.3	4.9	5.35	5.2	4.7	4.45	4.55	....
18	3.7	3.2	4.4	4.95	5.35	4.85	4.05	4.5	4.65	....
19	3.45	3.2	4.45	4.8	5.4	4.8	5.9	4.45	4.7	....
20	3.45	3.2	4.45	4.95	5.35	5.05	6.4	4.45	5.35	....
21	3.25	3.15	4.4	5.15	5.1	5.2	6.45	4.35	5.0	....
22	3.15	3.1	4.4	5.3	4.9	5.35	5.1	5.0	4.95	....
23	3.1	3.05	4.35	5.4	5.05	5.3	5.2	5.8	4.9	....
24	3.1	3.05	4.15	5.3	5.35	5.15	....	4.9	4.95	....
25	3.2	3.15	4.25	5.0	5.45	4.85	....	4.7	4.9	....
26	3.5	3.25	4.5	4.9	5.35	4.6	....	4.75	4.8	....
27	3.85	3.2	4.3	5.15	5.15	4.4	....	4.8	5.0	....
28	3.35	3.3	4.25	5.25	5.0	4.4	....	4.95	5.2	....
29	3.35	....	4.55	5.2	5.0	4.3	....	5.0	4.95	....
30	3.55	....	4.8	5.05	5.05	4.5	....	4.9	5.4	....
31	3.55	....	5.0	....	5.15	....	4.6	4.85	....	....

NOTE.—Some backwater from ice Jan. 1 to 14. The automatic gage was washed out July 22. All gage heights from July 22 to Aug. 11 read on a chain gage which was referred to the same datum as the automatic gage. Gage heights after Aug. 11 from automatic gage. Maximum gage height July 2, 8.2 feet; maximum gage height July 13, 10.0 feet; maximum gage height July 21, 10.1 feet; maximum gage height Oct. 6 about 12.0 feet.

Daily discharge, in second-feet, of San Juan River near Bloomfield, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	800	615	5,780	2,920	7,300	6,900	2,020	2,000	6,100
2	....	910	615	5,380	2,780	8,800	12,200	1,820	1,780	....
3	....	752	660	5,000	3,090	8,600	11,200	1,820	1,400	3,580
4	....	615	752	5,000	3,580	8,600	8,500	1,620	1,490	....
5	....	615	1,580	5,380	5,550	9,050	5,600	1,450	1,680	....
6	....	615	7,360	4,250	7,000	9,300	3,200	1,450	1,580	....
7	....	490	5,780	4,620	8,800	8,800	2,500	1,450	1,490	....
8	....	412	2,620	3,900	8,800	8,800	2,300	1,450	1,490	....
9	....	412	2,620	3,250	10,600	10,200	1,700	1,450	1,490	....
10	....	450	3,250	3,250	10,600	10,000	1,000	1,120	1,490	....
11	....	412	5,990	2,920	9,100	8,900	900	1,120	1,490	....
12	....	412	2,920	3,250	8,000	8,450	1,500	1,400	1,320	....
13	....	490	1,390	3,250	7,600	7,750	7,800	1,400	1,440	....
14	....	490	1,220	2,620	7,100	7,750	10,100	1,680	1,490	....
15	1,150	450	1,300	2,350	6,900	7,550	1,900	1,680	1,680	....
16	1,020	490	1,780	2,920	7,100	6,900	3,200	1,400	1,580	....
17	2,350	450	2,100	3,900	7,700	6,450	2,900	1,320	1,490	....
18	1,020	530	2,350	4,080	7,700	5,000	1,450	1,400	1,680	....
19	752	530	2,490	3,580	7,900	4,800	7,800	1,320	1,780	....
20	752	530	2,490	4,080	7,700	5,200	9,500	1,320	3,580	....
21	572	490	2,350	4,810	6,600	5,750	9,800	1,180	2,500	....
22	490	450	2,350	5,380	5,750	6,400	3,850	2,500	2,370	....
23	450	412	2,220	5,780	6,400	6,200	4,200	5,250	2,250	....
24	450	412	1,780	5,380	8,300	5,550	3,920	2,250	2,370	....
25	530	490	1,990	4,250	8,700	4,450	3,640	1,780	2,250	....
26	800	572	2,620	3,900	8,300	3,600	3,370	1,890	2,000	....
27	1,220	530	2,100	4,810	7,400	2,900	3,100	2,000	2,500	....
28	660	615	1,990	5,190	6,800	2,900	2,830	2,380	3,080	....
29	660	....	2,780	5,000	6,800	2,600	2,560	2,500	2,370	....
30	660	....	3,580	4,440	7,000	3,050	2,290	2,250	3,750	....
31	660	....	4,250	....	6,850	....	2,020	2,120	....	....

NOTE.—Discharge interpolated for days of missing gage heights. Daily discharge determined as follows: Jan. 15 to May 4 from a fairly well-defined rating curve; May 5 to July 30, by the indirect method for shifting channels; July 31 to Aug. 11, from the 1910 curve; Aug. 12 to Oct. 3 from curve drawn through one measurement and parallel to the 1910 curve.

Monthly discharge of San Juan River at Bloomfield, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January 15-31	2,350	450	835	28,200	B.
February	910	412	530	29,400	B.
March	7,360	615	2,510	154,000	B.
April	5,780	2,350	4,260	253,000	B.
May	10,600	2,780	7,080	435,000	C.
June	10,200	2,600	6,720	400,000	C.
July	12,200	900	4,640	285,000	C.
August	5,250	1,120	1,800	111,000	C.
September	3,750	1,320	1,960	117,000	C.
The period				1,810,000	

SAN JUAN RIVER AT SHIPROCK, N. MEX.

Location.—At highway bridge one-fourth mile south of Shiprock Indian agency, about sec. 13, T. 12 N., R. 2 W. Navajo principal meridian. The nearest tributary, Chaco River, which enters a short distance above, is an intermittent stream carrying water only during certain portions of the year.

Records available.—January 14 to October 6, 1911, when the station was discontinued.

Drainage area.—13,070 square miles (from Land Office map).

Gage.—Chain gage.

Channel.—The measurements made do not indicate any change, but it is probable that changes occur during high water.

Discharge Measurements.—Made from bridge and by wading.

Winter flow.—Practically no ice.

Diversions.—Considerable water is diverted above this station for irrigation.

Floods.—During the first week of October, 1911, the most severe flood of many years occurred. The crest of this flood was approximately 22 feet on the gage.

Accuracy.—Prior to the flood of October conditions were favorable for reliable results.

Cooperation.—Station was maintained in cooperation with the Territorial engineer and the United States Indian Service.

Discharge measurements of San Juan River at Shiprock, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 14	Carroll and Burnham	6.25	2,180
Apr. 9	E. O. Christiansen	7.70	5,250
May 29	Burnham and Edwards	9.60	10,900
June 1	J. B. Stewart	9.40	10,200

Daily gage height, in feet, of San Juan River at Shiprock, N. Mex., for 1911.

[L. L. Burrell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		5.8	5.55	8.1	8.8	9.6	8.6	6.5	4.95	10.4
2		5.75	5.5	8.3	8.6	9.9	10.7	6.3	4.75	10.7
3		5.7	5.55	9.0	8.4	9.9	10.2	6.05	4.8	10.0
4		5.7	6.3	8.8	8.6	9.9	10.4	6.0	5.05	9.2
5		5.6	6.6	8.7	9.0	10.0	10.3	5.75	5.0	11.6
6		5.6	8.5	8.6	9.8	10.4	10.1	5.4	4.95	[a]19.0
7		5.55	9.3	8.2	10.3	10.2	9.8	5.5	5.0	
8		5.4	8.2	8.1	10.6	10.5	9.4	5.35	4.9	
9		5.35	7.3	7.8	10.8	10.6	9.5	5.1	4.65	
10		5.35	7.7	7.8	10.8	10.6	9.2	5.1	4.7	
11		5.3	8.3	7.6	10.6	10.6	9.0	5.05	4.65	
12		5.4	8.6	7.3	9.9	10.0	9.0	5.25	4.6	
13		5.45	7.4	7.8	9.6	10.0	10.0	5.1	5.15	
14	6.25	5.4	6.8	7.6	9.5	9.8	11.7	5.1	5.2	
15	6.1	5.35	6.6	7.6	9.4	10.0	9.6	5.05	5.2	
16	5.8	5.35	6.6	7.4	9.4	9.6	9.0	4.85	5.15	
17	6.6	5.35	6.8	7.8	9.6	9.4	10.4	4.8	5.05	
18	6.0	5.35	7.1	8.4	9.6	9.1	8.8	4.85	5.1	
19	5.65	5.4	7.2	8.2	9.8	8.9	10.1	4.75	5.7	
20	5.55	5.3	7.4	8.3	9.9	9.0	12.2	4.65	6.3	
21	5.55	5.35	7.6	8.5	9.6	9.3	10.0	4.7	6.0	
22	5.45	5.3	7.5	8.6	9.2	9.4	9.8	4.7	5.25	
23	5.4	5.15	7.5	9.3	8.8	9.6	8.3	7.6	4.95	
24	5.3	5.05	7.4	9.2	9.0	9.2	8.0	6.5	4.8	
25	5.45	5.05	7.4	8.9	9.7	9.0	8.3	5.8	5.15	
26	5.65	5.4	7.4	8.7	9.6	8.8	8.4	5.7	4.9	
27	6.0	5.4	7.4	8.8	9.5	8.2	8.0	5.55	4.9	
28	5.7	5.5	7.2	9.4	9.6	8.0	7.5	5.55	6.0	
29	5.4		7.4	9.3	9.4	8.0	7.3	5.55	6.2	
30	5.4		7.4	9.1	9.2	8.0	7.0	5.3	7.3	
31	5.9		8.0		9.5		6.8	5.2		

[a] Maximum gage height about 22.0 feet.

Daily discharge, in second-feet, of San Juan River at Shiprock, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	....	1,450	1,110	6,280	8,300	10,900	7,700	2,800	512	13,600
2	....	1,380	1,050	6,820	7,700	11,900	14,700	2,250	375	14,700
3	....	1,300	1,110	8,950	7,100	11,900	12,900	1,820	400	12,200
4	....	1,300	2,250	8,300	7,700	11,900	13,600	1,750	600	9,600
5	....	1,180	2,800	8,000	8,950	12,200	13,200	1,380	550	18,000
6	....	1,180	7,400	7,700	11,600	13,600	12,600	950	512	47,600
7	....	1,110	9,920	6,550	13,200	12,900	11,600	1,050	550	....
8	....	950	6,550	6,280	14,300	14,000	9,250	900	475	....
9	....	900	4,250	5,450	15,000	14,300	10,600	650	325	....
10	....	900	5,200	5,450	15,000	14,300	9,600	650	350	....
11	....	850	6,820	4,950	14,300	14,300	8,950	600	325	....
12	....	950	7,700	4,250	11,900	12,200	8,950	800	300	....
13	....	1,000	4,480	5,450	10,900	12,200	12,200	650	700	....
14	2,160	950	3,200	4,950	10,600	11,600	18,400	650	750	....
15	1,900	900	2,800	4,950	9,250	12,200	10,900	600	750	....
16	1,450	900	2,800	4,480	9,250	10,900	8,950	438	700	....
17	2,800	900	3,200	5,450	10,900	9,250	13,600	400	600	....
18	1,750	900	3,800	7,100	10,900	9,280	8,300	438	650	....
19	1,240	950	4,020	6,550	11,600	8,620	12,600	375	1,300	....
20	1,110	850	4,480	6,820	11,900	8,950	20,400	325	2,250	....
21	1,110	900	4,950	7,400	10,900	9,920	12,200	350	1,750	....
22	1,000	850	4,700	7,700	9,600	9,250	11,600	350	800	....
23	950	700	4,700	9,920	8,300	10,900	6,820	4,950	512	....
24	850	600	4,480	9,600	8,950	9,600	6,000	2,600	400	....
25	1,000	600	4,480	8,620	11,200	8,950	6,820	1,450	700	....
26	1,240	950	4,480	8,000	10,900	8,300	7,100	1,300	475	....
27	1,750	950	4,480	8,300	10,600	6,550	6,000	1,110	475	....
28	1,300	1,050	4,020	9,250	10,900	6,000	4,700	1,110	1,750	....
29	950	....	4,480	9,920	9,250	6,000	4,250	1,110	2,080	....
30	950	....	4,480	9,280	9.600	6,000	3,600	850	4,250	....
31	1,600	....	6,000	....	10,600	....	3,200	750	....	....

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of San Juan River at Shiprock, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January 14-31	2,800	850	1,400	50.000	C.
February	1,450	600	979	54,400	C.
March	9,920	1,050	4,390	270,000	C.
April	9,920	4,250	7,090	422,000	C.
May	15,000	7,100	10,700	658,000	C.
June	14,300	6,000	10,600	631,000	C.
July	20,400	3,200	10,000	615.000	C.
August	4,950	325	1,140	70,100	C.
September	4,250	300	872	51,900	C.
October 1-6	47,600	9,600	19,300	230,000	D.
The period	....	....	....	3,050,000	

NAVAJO RIVER AT CHROMO, COLO.

Location.—At Chromo, Colo., in sec. 3, T. 32 N., R. 1 E. New Mexico principal meridian, near the southern boundary of the San Juan National Forest. Nearest tributary, Little Navajo Creek, enters 150 yards below.

Records available.—November 24 to December 31, 1911.

Drainage area.—171 square miles (measured from Hayden's atlas).

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater, and measurements are made to determine the discharge.

Diversions.—A few small ditches divert water above the station for irrigation.

Accuracy.—As the station has not yet been completely rated estimates of discharge can not be presented.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. B. Waha:

November 24, 1911: Gage height, 1.60 feet; discharge, 95.6 second-feet.

Daily gage height, in feet, of Navajo River at Chromo, Colo., for 1911.

[N. B. Price, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		1.8	11		1.6	21		2.15
2		1.6	12		1.6	22		2.3
3		1.55	13		1.6	23		2.15
4		1.55	14		1.65	24	1.6	2.7
5		1.65	15		1.65	25	1.6	3.5
6		1.6	16		1.85	26	1.6	3.7
7		1.55	17		2.25	27	1.6	3.65
8		1.55	18		2.45	28	1.6	3.4
9		1.55	19		2.25	29	1.8	3.4
10		1.55	20		2.2	30	1.8	3.2
						31		3.5

NOTE.—Ice present Nov. 29 to Dec. 1 and Dec. 16 to 31.

PIEDRA RIVER AT PIEDRA, COLO.

Location.—At Piedra post office, Colo., in sec. 8, T. 34 N., R. 4 W. New Mexico principal meridian, in the San Juan National Forest. Nearest tributary, Yellow Jacket Creek, enters one-fourth mile below.

Records available.—November 26 to December 31, 1911.

Drainage area.—376 square miles (measured from Hayden's atlas).

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes little if any backwater at this station.

Diversions.—A number of small ditches divert water above the station for irrigation.

Accuracy.—As this station has not been completely rated estimates of discharge can not be presented.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. B. Waha:

November 26, 1911: Gage height, 1.85 feet; discharge, 162 second-feet.

Daily gage height, in feet, of Piedra River at Piedra, Colo., for 1911.

[Allen Snyder, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1			11			21		
2		2.0	12			22		
3			13			23		
4		1.95	14			24		
5			15			25		
6		1.8	16			26	1.85	
7			17			27		
8			18			28	1.9	
9			19			29	1.9	
10			20			30	2.0	
						31		

PIEDRA RIVER AT ARBOLES, COLO.

Location.—At the railroad bridge at Arboles, Colo., in sec. 16, T. 32 N., R. 5 W., 1 mile above the junction with San Juan River. No tributaries between station and mouth.

Records available.—June 19, 1895, to September 30, 1899; August 21, 1910, to December 31, 1911.

Drainage area.—650 square miles.

Gage.—Vertical staff.

Channel.—Practically permanent except during high water.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Diversions.—There are court decrees for diversions of 18 second-feet from Piedra River in Colorado, and 52 second-feet from Colorado tributaries.

Cooperation.—Records are furnished complete for publication by the State engineer.

Discharge measurements of Piedra River at Arboles, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 21	Clayton and Turner	1.18	131	Sept. 1	B. S. Clayton	1.95	820
Mar. 22	B. S. Clayton	2.90	843	Nov. 16	do	3.60	364
Apr. 23	do	4.60	2,000	Dec. 18[a]	do		174
May 25	do	4.55	1,900				

[a] Ice conditions.

Daily gage height, in feet, of Piedra River at Arboles, Colo., for 1911.

[L. E. Smack, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.0	1.5	1.3	4.65	3.5	4.45	4.9	2.45	2.0	2.3	3.75	3.5
2	1.0	1.65	1.3	4.85	3.35	4.6	5.05	2.3	2.0	2.45	3.75	3.5
3	1.0	1.6	1.5	4.7	3.75	4.75	4.55	2.25	1.9	3.5	3.7	3.5
4	1.05	1.45	1.8	4.5	3.95	4.75	3.95	2.15	1.9	4.25	3.6	3.5
5	1.05	1.4	2.25	4.95	4.55	4.85	3.95	2.1	1.85	14.0	3.6	3.4
6	1.1	1.3	2.85	4.35	4.95	4.75	3.65	2.0	1.8	10.0	3.6	3.4
7	1.1	1.25	2.3	4.8	5.35	4.6	3.55	2.0	1.8	7.5	3.6	3.4
8	1.2	1.2	2.45	4.7	5.55	4.6	3.45	1.95	1.8	7.0	3.6	3.35
9	1.2	1.1	2.6	4.55	5.75	4.65	3.15	1.9	1.7	4.75	3.55	3.3
10	1.2	1.2	2.5	3.85	5.25	4.65	3.1	1.9	1.7	4.50	3.45	3.3
11	1.5	1.3	3.1	3.75	4.95	4.55	3.65	1.9	1.6	4.75	3.45	3.25
12	1.5	1.3	2.7	3.7	4.6	4.45	3.45	1.85	1.55	4.0	3.45	3.25
13	2.0	1.2	2.65	3.75	4.35	4.45	4.05	1.8	1.5	4.0	3.45	3.2
14	2.0	1.25	2.75	3.55	4.2	4.4	3.85	1.8	1.5	4.0	3.5	3.2
15	2.0	1.3	2.75	3.65	4.25	4.3	3.9	1.75	1.6	4.0	3.4	3.2
16	2.5	1.3	2.9	3.8	4.2	4.3	3.55	1.7	1.55	4.0	3.4	3.2
17	2.45	1.35	3.0	4.05	4.3	4.45	3.35	1.6	1.5	3.9	3.65	3.0
18	2.2	1.35	2.95	4.25	4.5	4.4	3.5	1.6	1.5	3.85	3.7	......
19	2.2	1.4	2.9	4.15	4.65	3.9	4.1	1.6	1.5	3.85	3.7	......
20	1.15	1.2	2.85	4.25	4.5	4.05	4.15	1.55	2.05	3.8	3.6	......
21	1.1	1.1	2.75	4.35	4.0	4.1	4.35	1.5	1.85	3.8	3.6	......
22	1.1	1.1	3.0	4.65	4.1	4.1	3.9	2.05	1.75	3.8	3.6	......
23	1.0	1.2	2.9	4.75	4.2	4.2	3.5	2.8	1.75	4.0	3.55	......
24	1.05	1.3	2.8	4.35	4.4	4.0	3.5	2.45	1.65	4.05	3.55	......
25	1.1	1.2	2.9	4.3	4.55	3.85	3.6	2.35	1.6	4.05	3.5	......
26	1.5	1.2	2.95	4.6	4.4	3.6	3.4	2.2	2.5	4.0	3.5	......
27	1.45	1.15	2.85	4.65	4.25	3.6	3.4	2.8	2.0	4.1	3.6	......
28	1.4	1.3	2.75	4.5	4.2	3.65	3.2	2.85	2.0	4.0	3.65	......
29	1.2	......	3.2	4.45	4.2	3.55	3.0	2.85	3.55	4.05	3.8	......
30	1.15	......	3.35	4.3	4.2	3.8	3.0	2.35	4.15	4.0	3.65	......
31	1.2	......	3.8	......	4.25	......	2.6	2.0	......	3.85	......	......

NOTE.—Ice formed on the stream Dec. 18 and existed to the end of the year.

Daily discharge, in second-feet, of Piedra River at Arboles, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	100	175	130	2,082	1,240	1,932	2,275	572	345	490	425	330
2	100	215	130	2,235	1,135	2,045	2,395	490	345	572	425	330
3	100	200	175	2,120	1,415	2,158	2,008	465	306	1,240	405	330
4	102	162	265	1,970	1,558	2,158	1,558	415	305	1,782	365	330
5	102	150	465	2,315	2,008	2,235	1,558	390	285	9,370	365	295
6	105	130	808	1,858	2,315	2,158	1,345	345	265	6,250	365	295
7	105	122	490	2,195	2,635	2,045	1,275	345	265	2,570	365	295
8	115	115	572	2,120	2,795	2,045	1,205	325	265	2,210	365	278
9	115	105	655	2,008	2,955	2,082	1,002	305	230	855	348	260
10	115	115	600	1,485	2,555	2,082	970	305	230	735	312	260
11	175	130	970	1,415	2,315	2,008	1,345	305	200	855	312	242
12	175	130	710	1,380	2,045	1,932	1,205	285	188	525	312	242
13	345	115	685	1,415	1,858	1,932	1,632	265	175	525	312	225
14	345	122	745	1,275	1,745	1,895	1,485	265	175	525	330	225
15	345	130	745	1,345	1,782	1,820	1,520	248	200	525	295	225
16	600	130	840	1,450	1,745	1,820	1,275	230	188	525	295	225
17	572	140	905	1,632	1,820	1,932	1,135	200	175	485	385	160
18	440	140	872	1,782	1,970	1,895	1,240	200	175	465	405	174
19	440	150	840	1,708	2,082	1,520	1,670	200	175	465	405	174
20	110	115	808	1,782	1,970	1,632	1,708	188	368	445	365	174
21	105	105	745	1,858	1,595	1,670	1,858	175	285	445	365	174
22	105	105	905	2,082	1,670	1,670	1,520	368	248	445	365	174
23	100	115	840	2,158	1,745	1,745	1,240	775	248	525	348	160
24	102	130	775	1,858	1,895	1,595	1,240	572	215	545	348	160
25	105	115	840	1,820	2,008	1,485	1,310	518	200	545	330	160
26	175	115	872	2,045	1,895	1,310	1,170	440	600	525	330	160
27	162	110	808	2,082	1,782	1,310	1,170	775	345	565	365	150
28	150	130	745	1,970	1,745	1,345	1,035	808	345	525	385	150
29	115	....	1,035	1,932	1,745	1,275	905	808	1,275	545	445	150
30	110	....	1,135	1,820	1,745	1,450	905	518	1,708	525	385	150
31	115	....	1,450	....	1,782	....	655	345	....	465	....	150

NOTE.—Discharge Oct. 5 and Dec. 18 to 31 estimated; estimate for Oct. 5 only approximate.

Monthly discharge of Piedra River at Arboles, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	600	100	192	11,802
February	215	105	133	7,371
March	1,450	130	728	44,757
April	2,315	1,275	1,840	109,482
May	2,955	1,135	1,921	118,116
June	2,235	1,275	1,806	107,466
July	2,395	655	1,381	84,920
August	808	175	401	24,664
September	1,708	175	344	20,467
October	9,370	445	1,196	73,525
November	445	295	361	21,465
December	330	150	220	13,501
The year	9,370	100	881	637,575

LOS PINOS RIVER NEAR IGNACIO, COLO.

Location.—At the highway bridge near Ignacio Indian agency, about sec. 8, T. 33 N., R. 7 W. New Mexico principal meridian, 1 mile north of Ignacio. Nearest tributary is a small stream that enters from the west 2 miles below.

Records available.—April 22, 1899, to October 31, 1903; September 1, 1910, to October 4, 1911.

Drainage area.—450 square miles.

Gage.—Chain gage.

Channel.—Shifting.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—No data.

Diversions.—A number of ditches divert water above the station for irrigation.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of Los Pinos River near Ignacio, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 18	Clayton and Turner..	2.22	110	June 29	B. S. Clayton........	4.35	1,120
Mar. 21	B. S. Clayton........	3.10	455	Sept. 1	.....do...............	2.40	180
Apr. 22	.....do..............	4.00	1,070	Nov. 15	.....do...............	(a)	272
May 24	.....do..............	4.80	1,990	Dec. 16	.....do...............	(a)	167

[a] Gage washed out.

Daily gage height, in feet, of Los Pinos River near Ignacio, Colo., for 1911.

[Mrs. C. F. Werner, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	1.85	2.4	2.2	3.95	4.0	5.25	5.1	3.05	2.4	4.5
2	1.85	2.2	2.25	4.0	4.1	5.3	5.4	3.0	2.4	4.05
3	1.9	2.2	2.35	3.9	4.0	5.15	5.7	2.95	2.4	4.05
4	1.9	2.3	2.3	3.95	3.95	5.3	5.35	2.9	2.6	4.0
5	2.0	2.2	2.8	3.95	4.5	5.55	5.0	2.75	2.7	(a)
6	2.0	2.2	2.95	3.85	4.95	5.65	4.75	2.55	2.6	....
7	2.0	2.2	2.85	3.55	5.0	5.45	4.65	2.45	2.5	....
8	2.0	2.15	2.9	3.6	5.05	5.45	4.5	2.2	2.45	....
9	2.0	2.05	3.05	3.5	5.15	5.6	4.4	2.1	2.4	....
10	2.05	2.0	3.25	3.4	5.25	5.8	4.35	2.05	2.4	....
11	2.55	2.1	3.4	3.55	4.9	5.7	4.2	2.1	2.3	....
12	2.65	2.1	3.2	3.45	4.7	5.45	4.25	2.0	2.3	....
13	2.55	2.15	3.0	3.3	4.7	5.1	4.7	2.0	2.7	....
14	2.4	2.15	2.9	3.4	4.45	5.3	5.15	2.0	2.8	....
15	2.3	2.15	2.95	3.5	4.65	5.05	4.4	1.95	2.75	....
16	2.15	2.15	2.75	3.55	4.7	5.1	4.35	1.9	2.6	....
17	2.15	2.1	2.9	3.75	4.65	4.7	4.05	1.9	2.6	....
18	2.45	2.1	2.95	3.7	4.75	4.7	4.15	1.9	2.5	....
19	2.3	2.2	3.1	3.7	4.8	5.1	4.55	1.8	2.6	....
20	2.2	2.2	3.2	4.05	4.6	4.5	4.35	1.9	2.7	....
21	2.15	2.2	3.15	4.1	4.65	5.0	4.45	1.8	2.6	....
22	2.15	2.2	3.3	4.1	4.5	5.4	4.2	2.7	2.55	....
23	2.05	2.25	3.25	4.2	4.75	5.1	4.2	3.05	2.55	....
24	2.05	2.25	3.15	4.25	4.7	4.95	4.6	2.95	2.7	....
25	2.25	2.25	3.2	4.2	4.9	4.75	4.6	2.7	2.7	....
26	2.45	2.25	3.15	4.25	4.9	4.4	4.35	2.45	3.2	....
27	2.35	2.25	3.15	4.2	4.7	4.3	4.05	2.35	3.4	....
28	2.25	2.25	3.25	4.25	4.65	4.55	4.0	2.4	3.2	....
29	2.3	....	3.55	4.2	4.75	4.35	3.75	2.4	3.25	....
30	2.25	....	3.4	4.25	4.5	4.45	3.35	2.3	4.4	....
31	2.3	....	3.8	....	4.75	....	3.20	2.3	....	....

[a] Gage washed out by flood.

Daily discharge, in second-feet, of Los Pinos River near Ignacio, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	65	170	120	1,032	1,075	2,615	1,890	380	170	2,460
2	65	120	130	1,075	1,165	2,690	2,310	360	170	1,825
3	70	120	155	995	1,075	2,470	2,780	340	170	1,825
4	70	140	140	1,032	1,032	2,690	2,235	320	225	1,760
5	85	120	305	1,032	1,605	3,080	1,760	270	255	....
6	85	120	372	950	2,192	3,245	1,472	210	225	....
7	85	120	328	720	2,260	2,920	1,375	182	195	....
8	85	110	350	755	2,330	2,920	1,240	120	182	....
9	85	92	420	685	2,470	3,160	1,160	100	170	....
10	92	85	530	620	2,615	3,500	1,122	92	170	....
11	215	100	620	720	2,125	3,330	1,015	100	145	....
12	248	100	500	652	1,855	2,920	1,050	85	145	....
13	215	110	395	560	1,855	2,400	1,420	85	225	....
14	170	110	350	620	1,545	2,690	1,955	85	285	....
15	140	110	372	685	1,790	2,330	1,160	78	270	....
16	110	110	285	720	1,855	2,400	1,122	70	225	....
17	110	100	350	870	1,790	1,855	918	70	225	....
18	185	100	372	830	1,922	1,855	982	70	195	....
19	140	120	445	830	1,990	2,400	1,285	60	225	....
20	120	120	500	1,120	1,725	1,605	1,122	70	255	....
21	110	120	472	1,165	1,790	2,260	1,200	60	225	....
22	110	120	560	1,165	1,605	2,840	1,015	255	210	....
23	92	130	530	1,265	1,922	2,400	1,015	380	210	....
24	92	130	472	1,320	1,855	2,160	1,330	340	255	....
25	130	130	500	1,265	2,125	1,840	1,330	255	255	....
26	185	130	472	1,320	2,125	1,380	1,122	182	445	....
27	155	130	472	1,265	1,855	1,220	918	158	540	....
28	130	130	530	1,320	1,790	1,420	885	170	445	....
29	140	....	720	1,265	1,922	1,120	730	170	468	....
30	130	....	620	1,320	1,605	1,200	515	145	1,160	....
31	140	....	910	....	1,922	....	445	145	....	....

Monthly discharge of Los Pinos River near Ignacio, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	248	65	124	7,644
February	170	85	118	6,540
March	910	120	429	26,374
April	1,320	560	976	58,052
May	2,615	1,032	1,832	112,635
June	3,500	1,120	2,364	140,658
July	2,780	445	1,286	79,097
August	380	60	174	10,725
September	1,160	145	279	16,602
October 1-4	2,460	1,760	1,968	15,610
The period	....	....	....	473,937

ANIMAS RIVER AT TACOMA, COLO.

Location.—200 feet south of the Denver & Rio Grande Railroad bridge No. 171a at Tacoma, Colo. Nearest tributary, Canon Creek, enters from the east one-half mile above the station.

Records available.—March 25, 1908, to November 27, 1909, and February 1 to October 5, 1911.

Drainage area.—408 square miles (Hayden's atlas).

Gage.—Automatic recording gage.

Channel.—Shifts during high water.

Discharge measurements.—Made by wading at low stages and from a bridge during high water.

Diversions.—No data.

Cooperation.—Station is maintained and records are furnished by the San Juan Water & Power Co.

Discharge measurements of Animas River at Tacoma, Colo., in 1908 and 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
1908.		*Feet.*	*Sec.-ft.*	1908.		*Feet.*	*Sec.-ft.*
Feb. 26	J. A. Clay	2.00	180	Dec. 9	E. C. Myers	2.00	165
Mar. 31	G. Weaver	2.40	255				
May 21	E. C. Myers	3.92	1,140	1911.			
June 12	.....do	5.22	3,080	Mar. 25	Chay and Maris	1.00	239
July 17	.....do	3.53	800	Sept. 2	O. M. Wimmer	1.70	426
Oct. 18	.....do	2.20	225				

Daily gage height, in feet, of Animas River at Tacoma, Colo., for 1908-9 and 1911.

[Engineers San Juan Water & Power Co., observers.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.										
1	....	2.4	3.4	4.4	4.3	3.6	2.7	2.25	2.1	2.0
2	....	2.45	3.55	4.7	4.2	4.1	2.7	2.2	2.1	1.95
3	....	2.55	3.55	4.75	4.0	3.6	2.7	2.2	2.1	2.0
4	....	2.65	3.25	4.75	4.1	3.4	2.65	2.2	2.1	2.0
5	....	2.7	3.05	4.75	4.25	3.4	2.55	2.15	2.1	2.0
6	....	2.75	3.0	4.65	4.25	3.35	2.6	2.15	2.1	2.0
7	....	2.65	3.05	4.2	4.2	3.2	2.55	2.2	2.05	2.0
8	....	2.6	3.35	4.1	3.95	3.2	2.55	2.2	2.05	2.0
9	....	2.6	3.5	4.9	3.9	3.15	2.5	2.15	2.05	1.95
10	....	2.65	3.45	5.5	3.85	3.1	2.55	2.15	2.0	1.9
11	....	2.75	3.3	5.9	4.0	3.15	2.45	2.15	2.0	1.85
12	....	2.9	3.35	5.6	4.0	3.05	2.4	2.1	2.0	1.85
13	....	3.1	3.15	5.7	4.0	2.95	2.3	2.1	2.0	1.85
14	....	3.3	3.1	5.8	3.85	3.15	2.3	2.1	2.05	1.85
15	....	3.35	3.1	5.6	3.8	3.25	2.3	2.05	2.05	1.9
16	....	3.35	3.35	5.7	3.75	3.25	2.25	2.1	2.05	1.9
17	....	3.35	3.8	5.55	3.7	4.6	2.25	2.15	2.1	1.8
18	....	3.3	4.2	5.25	3.6	4.7	2.2	2.2	2.05	1.7
19	....	3.3	4.55	5.5	3.45	4.5	2.2	2.2	2.0	1.7
20	....	3.4	4.5	5.15	3.3	4.0	2.25	2.15	2.0	1.75
21	....	3.55	4.1	5.35	3.2	3.75	2.3	2.15	2.05	1.8
22	....	3.6	4.0	5.35	3.1	3.6	2.25	2.1	1.95	1.85
23	....	3.35	3.7	5.35	3.1	3.5	2.2	2.1	1.95	1.95
24	....	3.2	3.55	5.35	3.1	3.35	2.2	2.15	2.05	1.95
25	2.4	3.15	3.65	5.4	3.05	3.2	2.35	2.15	2.0	1.9
26	2.45	3.0	3.9	5.35	3.1	3.05	2.35	2.1	2.0	1.9
27	2.5	2.95	3.8	5.3	3.15	3.0	2.3	2.1	2.0	1.85
28	2.45	2.95	3.7	5.15	3.05	3.0	2.3	2.15	2.0	1.85
29	2.45	2.95	3.8	4.9	3.1	2.95	2.25	2.1	2.0	1.85
30	2.4	3.05	4.4	4.55	3.25	2.8	2.25	2.1	2.0	1.85
31	2.4	....	4.6	....	3.45	2.7	....	2.1	....	1.9

Daily gage height, in feet, of Animas River at Taçoma, Colo., for 1908–9 and 1911—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1909.											
1	1.9	1.9	1.9	2.2	2.95	3.9	....	3.25	4.15	....	4.3
2	1.9	1.95	1.95	2.3	3.05	4.9	....	3.25	4.0	....	4.3
3	1.9	1.95	2.0	2.45	3.5	6.6	....	3.2	4.0	....	4.3
4	1.9	1.9	2.0	2.45	4.2	7.15	5.35	3.15	4.0	....	4.3
5	1.9	1.9	2.05	2.35	4.65	8.0	5.35	3.1	....	....	4.3
6	1.9	1.95	2.05	2.3	4.65	....	5.1	3.15	....	....	4.3
7	1.9	1.95	2.1	2.3	4.75	....	4.7	3.15	....	....	4.3
8	1.9	1.9	2.0	2.25	4.9	....	4.5	3.15	....	....	4.3
9	1.9	1.9	2.0	2.45	4.1	....	4.4	3.1	....	4.8	4.25
10	1.9	1.9	2.0	2.5	4.4	....	4.25	3.15	....	4.7	4.25
11	1.9	1.95	2.0	2.45	4.2	....	4.05	3.2	....	4.75	4.25
12	1.8	1.95	1.95	2.4	4.2	....	3.95	3.1	....	4.75	4.25
13	1.85	1.95	1.95	2.45	4.2	....	3.8	3.1	....	4.7	4.25
14	1.95	1.9	2.0	2.7	4.15	....	3.75	3.15	....	4.7	4.25
15	1.95	1.9	2.05	3.25	4.1	....	3.85	3.25	....	4.6	4.25
16	1.9	1.9	2.1	3.8	4.3	....	3.5	3.55	....	4.6	4.25
17	1.85	1.9	2.1	4.15	4.65	....	3.5	3.3	....	4.6	4.25
18	1.9	1.9	2.1	4.55	5.15	....	3.4	3.25	....	4.55	4.25
19	1.85	1.9	2.1	4.3	5.15	....	3.4	3.35	....	4.55	4.25
20	1.9	1.9	2.1	3.7	4.9	....	3.45	3.45	....	4.55	4.25
21	1.9	1.9	2.1	3.35	4.35	....	3.85	3.45	....	4.55	4.25
22	1.85	1.9	2.1	3.1	4.4	....	4.1	3.25	....	4.55	4.25
23	1.75	1.9	2.1	2.95	4.35	....	4.2	3.35	....	4.55	4.25
24	1.65	1.85	2.1	2.9	4.0	....	4.2	3.55	....	4.5	4.25
25	1.75	1.9	2.2	2.85	4.2	....	4.1	3.35	....	4.5	4.25
26	1.9	1.9	2.25	3.15	4.85	....	4.7	3.5	....	4.5	4.25
27	1.95	1.9	2.2	3.4	5.45	....	4.0	3.65	....	4.4	4.25
28	1.95	1.9	2.15	3.4	5.2	....	3.7	3.5	....	4.4	....
29	1.9	....	2.15	3.25	4.35	....	3.5	3.7	....	4.4	....
30	1.85	....	2.15	3.1	3.55	....	3.4	4.15	....	4.4	....
31	1.85	....	2.15	....	3.75	....	3.35	4.15	....	4.3	....

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1911.									
1	0.69	0.60	1.62	2.04	3.71	3.90	2.55	1.65	5.15
2	.66	.60	1.75	2.14	3.75	4.05	2.55	1.60	4.15
3	.66	.62	1.71	2.25	3.79	4.00	2.40	1.65	3.35
4	.67	.62	1.77	2.58	4.08	4.00	2.30	1.75	3.00
5	.65	.66	1.66	2.88	4.38	3.85	2.30	1.70	3.85
6	.62	.66	1.46	3.21	4.58	3.70	2.25	1.65	....
7	.58	.65	1.35	3.25	4.54	3.65	2.15	1.65	....
8	.58	.65	1.33	3.42	4.66	3.60	2.05	1.60	....
9	.62	.71	1.27	3.46	4.12	3.45	2.05	1.60	....
10	.65	.73	1.25	3.25	3.92	3.40	2.25	1.50	....
11	.62	.88	1.27	3.00	....	3.15	2.25	1.50	....
12	.66	.77	1.29	3.92	....	3.15	2.15	1.55	....
13	.62	.73	1.33	3.96	....	3.85	2.15	1.95	....
14	.65	.75	1.29	3.75	....	4.00	2.00	1.90	....
15	.65	.79	1.31	2.71	....	3.60	2.00	1.90	....
16	.65	.83	1.50	2.71	3.70	3.50	2.00	1.95	....
17	.65	.92	1.69	2.96	3.75	3.25	1.90	1.80	....
18	.60	.92	1.71	3.08	3.65	3.25	1.95	1.70	....
19	.65	.94	1.88	3.46	4.05	3.80	1.95	1.70	....
20	.62	.96	1.96	2.79	3.90	3.80	1.95	1.60	....
21	.58	.96	2.08	2.71	4.10	3.60	2.00	1.55	....
22	.56	.98	2.19	2.92	4.05	3.50	2.25	1.60	....
23	.50	1.00	2.27	3.04	4.00	3.45	2.25	1.95	....
24	.54	.96	2.06	3.50	4.05	3.30	2.05	1.80	....
25	.62	.96	2.04	3.50	3.85	3.30	2.05	1.65	....
26	.48	1.00	2.25	3.33	3.75	3.25	1.95	2.15	....
27	.60	1.00	2.42	3.21	3.85	3.15	1.90	2.55	....
28	.56	1.00	2.46	3.33	3.80	3.00	1.85	2.50	....
29	....	1.12	2.40	3.42	3.65	2.90	1.75	2.60	....
30	....	1.27	2.12	3.46	3.80	2.75	1.75	4.25	....
31	....	1.48	....	3.54	....	2.60	1.70	....	....

NOTE.—June 5 to July 3, 1909, the gage was not in place because of a flood. A flood on Sept. 5, 1909, washed the gage out. Gage washed out by floods June 11 to 15, 1911. A flood Oct. 6, 1911, took the gage out and changed the channel completely.

Daily discharge, in second-feet, of Animas River at Tacoma, Colo., for 1908-9.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.										
1	....	270	720	1,660	1,530	860	370	228	190	170
2	....	285	825	2,110	1,410	1,300	370	215	190	160
3	....	315	825	2,190	1,200	860	370	215	190	170
4	....	350	630	2,190	1,300	720	350	215	190	170
5	....	370	525	2,190	1,470	720	315	202	190	170
6	....	390	500	2,030	1,470	690	330	202	190	170
7	....	350	525	1,410	1,410	600	315	215	180	170
8	....	330	690	1,300	1,160	600	315	215	180	170
9	....	330	790	2,430	1,110	575	300	202	180	160
10	....	350	755	3,600	1,060	550	315	202	170	150
11	....	390	660	4,480	1,200	575	285	202	170	140
12	....	450	690	3,820	1,200	525	270	190	170	140
13	....	550	575	4,040	1,200	475	240	190	170	140
14	....	660	550	4,260	1,060	575	240	190	180	140
15	....	690	550	3,820	1,020	630	240	180	180	150
16	....	690	690	4,040	980	630	228	190	180	150
17	....	690	1,020	3,710	940	1,950	228	202	190	130
18	....	660	1,410	3,070	860	2,110	215	215	180	110
19	....	660	1,880	3,600	755	1,800	215	215	170	110
20	....	720	1,800	2,880	660	1,200	228	202	170	120
21	....	825	1,300	3,280	600	980	240	202	180	130
22	....	860	1,200	3,280	550	860	228	190	160	140
23	....	690	940	3,280	550	790	215	190	160	160
24	....	600	825	3,280	550	690	215	202	180	160
25	270	575	900	3,380	525	600	255	202	170	150
26	285	500	1,110	3,280	550	525	255	190	170	150
27	300	475	1,020	3,170	575	500	240	190	170	140
28	285	475	940	2,880	525	500	240	202	170	140
29	285	475	1,020	2,430	550	475	228	190	170	140
30	270	525	1,660	1,880	630	410	228	190	170	140
31	270	....	1,950	....	755	370	....	190	....	150

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1909.						
1	150	150	150	215	475	1,110
2	150	160	160	240	525	2,430
3	150	160	170	285	790	6,150
4	150	150	170	285	1,410	7,520
5	150	150	180	255	2,080	9,650
6	150	160	180	240	2,030	....
7	150	160	190	240	2,180	....
8	150	150	170	228	2,430	....
9	150	150	170	285	1,300	....
10	150	150	170	300	1,660	....
11	150	160	170	285	1,410	....
12	130	160	160	270	1,410	....
13	140	160	160	285	1,410	....
14	160	150	170	370	1,360	....
15	160	150	180	630	1,300	....
16	150	150	190	1,020	1,530	....
17	140	150	190	1,360	2,030	....
18	150	150	190	1,880	2,880	....
19	140	150	190	1,530	2,880	....
20	150	150	190	940	2,430	....
21	150	150	190	690	1,600	....
22	140	150	190	550	1,660	....
23	120	150	190	475	1,600	....
24	105	140	190	450	1,200	....
25	120	150	215	430	1,410	....
26	150	150	228	575	2,350	....
27	160	150	215	720	3,490	....
28	160	150	202	720	2,970	....
29	150	....	202	630	1,600	....
30	140	....	202	550	825	....
31	140	....	202	....	980	....

NOTE.—Daily discharge determined from a well-defined rating curve. Owing to changed channel conditions and insufficient measurements no estimates of discharge have been made for 1911.

Monthly discharge of Animas River at Tacoma, Colo., for 1908.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1908.					
March 25-31	300	270	280	3,880	B.
April	860	270	517	30,800	B.
May	1,950	500	951	58,500	B.
June	4,480	1,300	2,970	177,000	B.
July	1,470	525	947	58,200	B.
August	2,110	370	795	48,900	B.
September	370	215	269	16,000	B.
October	228	180	201	12,400	B.
November	190	160	177	10,500	B.
December	170	110	148	9,100	B.
The period				425,000	
1909.					
January	160	105	145	8,920	B.
February	160	140	152	8,440	B.
March	228	150	185	11,400	B.
April	1,880	215	566	33,700	B.
May	3,490	475	1,710	105,000	B.
June 1-5	9,650	1,110	5,370	53,300	C.
The period				221,000	

ANIMAS RIVER AT DURANGO, COLO.

Location.—At the footbridge at the foot of Fourteenth Street in Durango. Nearest tributary, Lightner Creek, enters just above.

Records available.—From June 20, 1901, to December 31, 1905, at a point above Lightner Creek; January 1, 1910, to September 2, 1911.

Drainage area.—694 square miles (Hayden's atlas).

Gage.—Automatic recording gage.

Channel.—Liable to shift during high water.

Discharge measurements.—Made from bridge.

Winter flow.—Little if any backwater from ice during the winter months.

Diversions.—Water is diverted above the station for irrigation.

Floods.—The severest flood in many years occurred in the first week of October, 1911, when the river reached a maximum stage of 13.6 feet.

Accuracy.—Estimates for 1911 based on measurements during 1911 are fair, but no estimates have been made for 1910 as no measurements were made during that year.

Cooperation.—Records furnished through the courtesy of the San Juan Water & Power Co.

Discharge measurements of Animas River at Durango, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 24	R. M. Owens	2.70	177	Apr. 4	Chay and Nale	4.20	1,290
27	O. M. Wimmer	2.86	220	Sept. 2	O. M. Wimmer	3.70	490
Mar. 30	Chay and Hale	3.70	801				

Daily gage height, in feet, of Animas River at Durango, Colo., for 1910–11.

[Engineers San Juan Water & Power Co., observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	3.0	3.0	2.9	3.7	5.0	6.15	3.9	3.3	2.9	2.9	2.8	2.4
2	3.0	2.9	2.9	3.7	4.8	5.9	3.9	3.3	2.9	2.9	2.8	2.4
3	3.0	3.0	2.95	3.8	4.5	5.85	3.8	3.3	2.9	2.9	2.8	2.4
4	3.0	2.9	3.2	3.7	4.5	5.6	3.8	3.35	2.9	2.9	2.9	2.4
5	3.0	2.9	3.4	3.65	4.65	5.5	3.8	3.85	2.9	2.9	2.9	2.4
6	3.0	3.0	3.6	3.6	4.7	5.35	3.7	3.5	2.9	2.9	2.8	2.4
7	3.0	3.0	3.8	3.6	4.8	5.15	3.6	3.4	2.9	2.9	2.8	2.4
8	3.25	2.9	3.9	3.65	5.0	5.15	3.6	3.3	2.9	2.8	2.8	2.4
9	3.3	2.9	3.9	3.7	5.25	5.1	3.55	3.3	2.9	2.8	2.8	2.4
10	3.2	2.95	3.7	3.7	5.7	5.0	3.5	3.3	2.9	2.8	2.8	2.4
11	3.2	2.9	3.75	3.8	6.0	5.0	3.4	3.3	2.9	2.8	2.8	2.4
12	3.2	2.9	3.75	3.8	6.0	5.0	3.4	3.3	2.9	2.8	2.8	2.4
13	3.1	2.9	3.85	3.9	5.7	4.85	3.4	3.25	2.9	2.8	2.8	2.4
14	3.2	2.9	3.9	3.9	5.55	5.0	3.35	3.4	2.9	2.8	2.8	2.4
15	3.2	2.9	3.9	3.8	5.35	5.0	3.3	3.3	2.9	2.8	2.8	2.4
16	3.2	2.9	3.9	3.7	5.1	4.7	3.35	3.3	2.9	2.8	2.8	2.4
17	3.1	2.9	3.9	3.6	4.8	4.5	3.3	3.2	2.9	2.8	2.8	2.4
18	3.1	2.9	3.9	3.6	4.8	4.3	3.35	3.0	2.9	2.8	2.7	2.4
19	3.1	2.9	4.0	3.9	4.9	4.45	3.3	2.9	2.9	2.8	2.6	2.4
20	3.0	2.9	4.1	4.3	4.9	4.35	3.3	2.9	2.9	2.8	2.5	2.4
21	3.0	2.9	4.2	4.5	4.9	4.3	3.3	2.9	2.9	2.8	2.5	2.4
22	2.95	2.9	4.4	4.4	4.8	4.3	3.3	2.9	2.9	2.8	2.5	2.4
23	2.95	2.9	4.5	4.4	4.55	4.3	3.3	2.9	2.9	2.8	2.5	2.4
24	3.0	2.9	4.45	4.6	4.5	4.3	3.3	2.9	2.9	2.8	2.5	2.4
25	3.0	2.9	4.3	4.9	4.6	4.0	3.4	2.9	2.9	2.8	2.5	2.4
26	3.0	2.9	4.2	5.2	4.5	3.8	3.4	2.9	2.9	2.8	2.5	2.4
27	3.0	2.9	4.0	5.2	4.8	3.85	3.4	2.9	2.9	2.8	2.5	2.4
28	2.95	2.9	3.9	5.4	5.4	4.15	3.3	2.9	2.9	2.8	2.4	2.4
29	3.0	....	3.8	5.5	5.8	4.4	3.35	2.9	2.9	2.8	2.4	2.4
30	3.0	....	3.8	5.3	6.1	4.1	3.4	2.9	2.9	2.8	2.4	2.4
31	3.0	....	3.7	....	6.25	....	3.55	2.9	....	2.8	....	2.4

[P. V. Sheridan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911.									
1	2.6	2.8	2.65	4.0	4.45	6.0	5.4	4.4	....
2	2.6	2.8	2.6	4.0	4.5	6.0	5.8	4.25	3.7
3	2.6	2.8	2.7	4.1	4.45	6.0	5.8	4.05	....
4	2.6	2.7	2.7	4.15	4.7	6.2	5.8	3.95	....
5	2.6	2.7	2.75	4.1	4.45	6.4	5.6	3.9	....
6	2.6	2.7	2.8	....	5.7	6.8	5.5	3.85	....
7	2.6	2.7	2.8	....	5.8	6.5	5.5	3.75	....
8	2.6	2.7	2.8	....	6.0	6.5	5.4	3.75	....
9	2.6	2.7	2.8	....	6.0	6.9	5.2	3.6	....
10	2.6	2.7	2.85	....	6.2	7.0	5.1	3.65	....
11	2.3	2.7	2.9	....	5.7	6.7	4.85	3.6	....
12	2.6	2.75	3.0	....	5.5	6.6	4.75	3.8	....
13	2.6	2.75	3.0	....	5.4	6.6	5.6	....	....
14	2.6	2.7	2.95	....	5.5	6.6	5.8	....	....
15	2.6	2.7	2.9	....	5.3	6.2	5.4	....	....
16	2.6	2.7	2.95	....	5.0	6.2	5.4	....	....
17	2.6	2.7	3.12	....	5.6	6.0	5.2	....	....
18	2.6	2.7	3.1	....	5.5	5.8	5.1	....	....
19	2.6	2.7	3.1	....	5.8	5.9	5.4	....	....
20	2.6	2.85	3.2	....	5.4	6.1	5.4	....	....
21	2.6	2.8	3.25	....	5.1	5.8	5.6	....	....
22	2.6	2.8	3.35	....	5.1	5.8	5.4	....	....
23	2.6	2.7	3.3	....	5.5	6.0	5.3	....	....
24	2.7	2.7	3.3	....	5.8	6.0	5.3	....	....
25	2.7	2.7	3.3	....	6.0	5.8	5.5	....	....
26	2.7	2.7	3.3	....	5.8	5.5	5.6	....	....
27	2.7	2.7	3.3	....	5.6	5.6	5.2	....	....
28	2.7	2.7	3.3	....	5.7	5.6	4.95	....	....
29	2.75	....	3.4	....	5.8	5.6	4.75	....	....
30	2.75	....	3.65	....	5.8	5.3	4.6	....	....
31	2.75	....	3.85	....	5.7	....	4.5	....	....

Daily discharge, in second-feet, of Animas River at Durango, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	165	210	175	1,080	1,510	3,000	2,410	1,460	....
2	165	210	165	1,080	1,560	3,000	2,800	1,320	810
3	165	210	185	1,180	1,510	3,000	2,800	1,130	....
4	165	185	185	1,220	1,740	3,200	2,800	1,040	....
5	165	185	198	1,180	1,510	3,400	2,600	990	....
6	165	185	210	....	2,700	3,800	2,500	945	....
7	165	185	210	....	2,800	3,500	2,500	855	....
8	165	185	210	....	3,000	3,500	2,410	855	....
9	165	185	210	....	3,000	3,900	2,220	720	....
10	165	185	225	....	3,200	4,000	2,120	765	....
11	165	185	240	....	2,700	3,700	1,890	720	....
12	165	198	280	....	2,500	3,600	1,790	900	....
13	165	198	280	....	2,410	3,600	2,600	....	....
14	165	185	260	....	2,500	3,600	2,800	....	....
15	165	185	240	....	2,320	3,200	2,410	....	....
16	165	185	260	....	2,030	3,200	2,410	....	....
17	165	185	348	....	2,600	3,000	2,220	....	....
18	165	185	335	....	2,500	2,800	2,120	....	....
19	165	185	335	....	2,800	2,900	2,410	....	....
20	165	225	400	....	2,410	3,100	2,410	....	....
21	165	210	435	....	2,120	2,800	2,600	....	....
22	165	210	510	....	2,120	2,800	2,410	....	....
23	165	185	470	....	2,500	3,000	2,320	....	....
24	185	185	470	....	2,800	3,000	2,320	....	....
25	185	185	470	....	3,000	2,800	2,500	....	....
26	185	185	470	....	2,800	2,500	2,600	....	....
27	185	185	470	....	2,600	2,600	2,220	....	....
28	185	185	470	....	2,700	2,600	1,960	....	....
29	198	....	550	....	2,800	2,600	1,790	....	....
30	198	....	765	....	2,800	2,320	1,650	....	....
31	198	....	945	....	2,700	....	1,560	....	....

Note.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Animas River at Durango, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	198	165	171	10,500	C.
February	225	185	192	10,700	C.
March	945	165	354	21,800	C.
April 1-5	....	....	1,150	11,400	C.
May	3,200	1,510	2,460	151,000	C.
June	4,000	2,320	3,130	186,000	C.
July	2,800	1,560	2,330	143,000	C.
August 1-12	1,460	720	975	23,200	C.

ANIMAS RIVER AT AZTEC, N. MEX.

Location.—At the highway bridge in sec. 9, T. 30 N., R. 11 W., one-half mile west of Aztec. No important tributaries between the station and the mouth of the river, about 12 miles below.

Records available.—June 21 to December 14, 1904; June 8, 1907, to December 31, 1911.

Drainage area.—1,300 square miles (measured from Land Office map).

Gage.—Vertical staff. The gage was originally placed at a wooden bridge one-half mile below the present site, but was transferred to its present position September 13, 1908. There is no determined relation between the two gage datums.

Channel.—Shifting during high water, but fairly permanent at other times.

Discharge measurements.—Made from bridge and by wading.

Winter flow.—Ice forms to a considerable depth along the edges during the greater part of the winter months, but the river seldom freezes across. Slush ice is of frequent occurrence.

Diversions.—Between Durango and Aztec many ditches divert water for irrigation.

Flood discharge.—Two severe floods have occurred on the Animas since records have been maintained. That of September 6, 1909, reached a maximum stage of 11 feet with a corresponding discharge of 16,000 second-feet; that of October 6, 1911, a stage of 13.5 feet with an approximate discharge of 30,000 second-feet. The latter flood is the severest that has occurred in many years.

Accuracy.—Prior to the October flood, conditions were favorable for reliable results. A change in the channel was caused by the flood, and for the remainder of the year the estimates can not be considered better than fair.

Cooperation.—During 1911 station was maintained in cooperation with the Territorial engineer and W. G. Black, Aztec, N. Mex.

Discharge measurements of Animas River at Aztec, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 24	G. H. Russell	3.61	224	June 3	J. B. Stewart	7.50	4,250
Feb. 24	do	3.60	189	Aug. 13	W. B. Freeman	4.60	794
Apr. 8	E. O. Christiansen	5.15	1,260	Nov. 21	G. H. Russell	2.89	537

Daily gage height, in feet, of Animas River at Aztec, N. Mex., for 1911.

[H. S. Wattles, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.8	3.8	3.8	6.1	5.9	7.5	7.2	5.8	4.3	7.8	3.1	2.8
2	3.8	3.85	3.8	6.4	5.7	7.6	7.0	5.5	4.2	8.4	3.1	2.8
3	3.75	3.7	3.8	6.2	5.7	7.6	7.7	5.4	4.2	7.8	3.1	2.7
4	3.7	3.75	3.8	6.0	5.9	7.8	7.4	5.3	4.2	6.4	3.1	2.7
5	3.7	3.8	4.1	5.9	6.5	8.0	7.0	5.1	4.2	9.8	3.1	2.7
6	3.7	3.85	5.0	5.7	7.0	8.2	7.0	5.0	4.2	......	3.0	2.7
7	3.7	3.8	5.0	5.5	7.2	8.4	6.9	4.9	4.2	7.8	3.0	2.7
8	3.7	3.7	4.8	5.3	7.4	8.2	7.0	4.8	4.2	6.0	3.0	2.7
9	3.7	3.75	5.0	5.1	7.6	8.4	6.8	4.7	4.1	5.5	3.0	2.7
10	3.7	3.6	5.1	5.1	7.6	8.4	6.5	4.7	4.1	5.0	3.0	2.6
11	4.0	3.6	5.5	5.0	7.2	8.8	6.3	4.7	4.1	4.6	3.0	2.6
12	......	3.6	5.1	5.0	6.9	8.3	6.5	4.7	4.1	4.4	2.9	2.6
13	......	3.65	4.9	5.0	6.8	8.3	6.8	4.6	4.5	4.2	2.9	2.6
14	......	3.7	4.9	5.0	6.8	8.1	7.8	4.6	4.4	4.0	2.9	2.6
15	......	3.75	4.85	5.0	6.6	8.0	7.3	4.5	4.4	3.9	2.9	2.6
16	......	3.7	4.85	5.0	6.5	7.8	7.5	4.5	4.4	3.8	2.9	2.5
17	......	3.75	5.1	5.0	6.7	7.5	6.8	4.4	4.4	3.7	2.9	2.5
18	......	3.7	5.2	5.1	7.0	7.4	6.6	4.3	4.3	3.6	2.8	2.5
19	......	3.75	5.1	5.4	7.2	7.2	7.6	4.3	5.4	3.5	2.8	2.5
20	......	3.7	5.2	5.8	7.2	7.3	7.7	4.3	4.4	3.4	2.8	2.5
21	......	3.75	5.2	6.0	6.6	7.5	7.0	4.3	4.3	3.3	2.8	2.5
22	......	3.8	5.3	6.0	6.6	7.7	7.4	4.45	4.3	3.2	2.9	2.5
23	......	3.85	5.3	6.4	6.8	7.6	6.9	5.0	4.2	3.2	2.9	2.4
24	3.7	3.65	5.3	6.3	7.1	7.4	6.8	4.9	4.5	3.2	2.9	2.3
25	3.75	3.7	5.3	5.9	7.3	7.3	7.8	4.6	4.4	3.2	2.9	2.2
26	3.8	3.7	5.3	5.8	7.3	7.0	7.3	4.5	4.3	3.2	2.8	2.1
27	3.7	3.7	5.2	6.0	7.1	6.7	7.1	4.5	5.0	3.3	2.8	2.0
28	3.75	3.8	5.1	6.2	7.2	6.7	6.7	4.5	5.0	3.8	2.8	2.3
29	3.8	......	5.3	6.3	7.2	6.8	6.4	4.4	5.0	3.4	2.8	2.3
30	3.95	......	5.5	6.2	7.2	6.8	6.2	4.4	6.3	3.2	2.8	2.3
31	3.8	......	5.7	......	7.3	......	6.0	4.3	......	3.2	......	2.3

NOTE.—Slight backwater from ice Jan. 1 to 11 and Dec. 23 to 31. Peak height Oct. 6, 13.5 feet, obtained from flood marks.

Daily discharge, in second-feet, of Animas River at Aztec, N. Mex., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	280	280	2,330	2,090	4,250	3,800	1,970	560	4,700	600	490
2	......	305	280	2,720	1,860	4,400	3,500	1,640	500	5,640	600	490
3	......	240	280	2,460	1,860	4,400	4,550	1,530	500	4,700	600	460
4	......	260	280	2,210	2,090	4,700	4,100	1,420	500	2,720	600	460
5	......	280	440	2,090	2,850	5,000	3,500	1,220	500	8,500	600	460
6	......	305	1,120	1,860	3,500	5,320	3,500	1,120	500	14,500	560	460
7	......	280	1,120	1,640	3,800	5,640	3,370	1,030	500	5,500	560	460
8	......	240	940	1,420	4,100	5,320	3,500	940	500	3,000	560	460
9	......	260	1,120	1,220	4,400	5,640	3,240	850	440	2,400	560	460
10	......	210	1,220	1,220	4,400	5,640	2,850	850	440	1,900	560	430
11	......	210	1,640	1,120	3,800	5,480	2,590	850	440	1,500	560	430
12	......	210	1,220	1,120	3,370	5,480	2,850	850	440	1,350	520	430
13	......	225	1,030	1,120	3,240	5,480	3,240	770	690	1,200	520	430
14	......	240	1,030	1,120	3,240	5,160	4,700	770	620	1,100	520	430
15	......	260	985	1,120	2,980	5,000	3,950	690	620	1,040	520	430
16	......	240	985	1,120	2,850	4,700	4,250	690	620	980	520	400
17	......	260	1,220	1,120	3,110	4,250	3,240	620	620	920	520	400
18	......	240	1,320	1,220	3,500	4,100	2,980	560	560	860	490	400
19	......	260	1,220	1,530	3,800	3,800	4,400	560	1,530	800	490	400
20	......	240	1,320	1,970	3,800	3,950	4,550	560	620	750	490	400
21	......	260	1,320	2,210	2,980	4,250	3,500	560	560	700	490	400
22	......	280	1,420	2,210	2,980	4,550	4,100	655	560	650	520	400
23	......	305	1,420	2,720	3,240	4,400	3,370	1,120	500	650	520	......
24	240	225	1,420	2,590	3,650	4,100	3,240	1,030	690	650	520	......
25	260	240	1,420	2,090	3,950	3,950	4,700	770	620	650	520	......
26	280	240	1,420	1,970	3,950	3,500	3,950	690	560	650	490	......
27	240	240	1,320	2,210	3,650	3,110	3,650	690	1,120	700	490	......
28	260	280	1,220	2,460	3,800	3,110	3,110	690	1,120	980	490	......
29	280	......	1,420	2,590	3,800	3,240	2,720	620	1,120	750	490	......
30	355	......	1,640	2,460	3,800	3,240	2,460	620	2,590	650	490	......
31	280	......	1,860	......	3,950	......	2,210	560	......	650	......	......

NOTE.—Daily discharge determined as follows: Discharge Jan. 1 to 23, estimated at 225 second-feet; discharge Jan. 24 to Oct. 5, from a well-defined rating curve; discharge after Oct. 6, from a poorly defined curve. Mean discharge Oct. 6 estimated; crest discharge was about 30,000 second-feet. Discharge Dec. 23 to 31 estimated at 350 second-feet.

Monthly discharge of Animas River at Aztec, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	238	14,600	C.
February	305	210	254	14,100	B.
March	1,860	280	1,130	69,500	B.
April	2,720	1,120	1,840	109,000	B.
May	4,400	1,860	3,370	207,000	B.
June	5,640	3,110	4,500	268,000	B.
July	4,700	2,210	3,540	218,000	B.
August	1,970	560	887	54,500	B.
September	2,590	440	705	42,000	B.
October	14,500	650	2,310	142,000	D.
November	600	490	532	31,700	C.
December	490	....	411	25,300	C.
The year	14,500	....	1,650	1,200,000	

HERMOSA CREEK NEAR HERMOSA, COLO.

Location.—In sec. 34, T. 37 N., R. 9 W. New Mexico principal meridian, in the San Juan National Forest, 1½ miles above Hermosa post office, 200 yards below the mouth of Buck Creek, 1½ miles above the mouth of Hermosa Creek. No tributaries between the station and mouth.

Records available.—November 28, 1911, to December 31, 1911.

Drainage area.—172 square miles (measured from topographic sheets).

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge measurements.—Made from a bridge 1 mile below station during high water and by wading at ordinary stages.

Winter flow.—So far as known, ice causes little if any backwater at this station.

Diversions.—The station is above all diversions.

Accuracy.—As the station has not been completely rated estimates of discharge can not be presented.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by H. B. Waha:

November 28, 1911: Gage height, 1.80 feet; discharge, 67.3 second-feet.

The following gage heights were also obtained: December 10, 1.9 feet; December 22, 2.1 feet; December 27, 2.0 feet. Gage heights December 22 and 27 read to top of ice.

FLORIDA RIVER NEAR DURANGO, COLO.

Location.—At Cash ranch, in sec. 19, T. 35 N., R. 8 W. New Mexico principal meridian, 7 miles east of Durango. Nearest important tributary, Red Creek, enters several miles above. There are a number of small intermittent tributaries nearer.

Records available.—September 18, 1910, to October 4, 1911.

Drainage area.—136 square miles (State engineer's report).

Gage.—Vertical staff.

Channel.—Shifting during high water.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—No data.

Diversions.—One diversion ditch heads above the station and others divert below to irrigate the lower valley.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of Florida River near Durango, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 21	B. S. Clayton	2.72	256	Aug. 30	B. S. Clayton	1.68	52.2
May 23	do	4.04	626	Dec. 15[a]	do	2.25	27
June 27	do	3.12	830				

[a] Ice conditions.

Daily gage height, in feet, of Florida River near Durango, Colo., for 1911.

[Thomas Cash, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	1.4	1.35	1.4	2.6	2.6	4.45	3.65	2.45	1.65	4.5
2	1.4	1.3	1.35	2.5	2.6	4.35	4.35	2.3	1.6	3.8
3	1.4	1.3	1.35	2.4	2.65	4.35	4.3	2.2	1.65	2.7
4	1.55	1.3	1.35	2.55	2.9	4.5	4.0	2.1	1.7	2.4
5	1.5	1.35	1.35	2.4	3.25	4.65	3.5	2.1	1.7	
6	1.5	1.3	1.4	2.4	3.5	4.7	3.2	2.0	1.65	
7	1.45	1.4	1.35	2.35	3.6	4.55	3.6	1.9	1.6	
8	1.4	1.5	1.4	2.3	3.9	4.55	3.15	1.9	1.6	
9	1.4	1.6	1.4	2.2	4.0	4.7	2.95	1.9	1.8	
10	1.4	1.5	1.5	2.15	3.9	4.7	2.85	1.9	2.2	
11	1.4	1.5	1.65	2.2	3.7	4.7	2.6	1.9	1.65	
12	1.4	1.35	1.6	2.3	3.6	4.6	2.9	1.8	1.6	
13	1.35	1.35	1.65	2.25	3.6	4.25	3.35	1.9	1.7	
14	1.3	1.35	1.7	2.2	3.4	4.45	3.55	1.8	1.7	
15	1.3	1.4	1.7	2.25	3.2	4.3	3.3	1.75	1.75	
16	1.4	1.4	1.7	2.35	3.3	4.05	3.1	1.8	1.7	
17	1.35	1.35	1.8	2.55	3.7	3.7	2.9	1.7	1.65	
18	1.3	1.35	1.85	2.5	3.9	3.85	2.75	1.7	1.6	
19	1.2	1.5	1.9	2.55	4.15	4.0	3.3	1.8	1.6	
20	1.2	1.5	1.9	2.7	3.6	3.85	3.4	1.7	1.7	

Daily gage height, in feet, of Florida River near Durango, Colo., for 1911—**Continued.**

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
21	1.3	1.4	1.9	2.8	3.45	4.25	3.5	1.7	1.6	
22	1.25	1.4	1.95	3.0	3.7	4.15	3.25	1.95	1.6	
23	1.3	1.5	1.9	3.0	4.1	3.9	3.3	1.9	1.7	
24	1.25	1.5	1.85	2.8	4.3	3.8	3.3	1.8	1.7	
25	1.3	1.4	1.9	2.7	4.1	3.7	4.2	1.8	1.65	
26	1.3	1.4	1.9	2.8	3.8	3.35	3.75	1.8	2.05	
27	1.25	1.4	1.9	2.9	3.7	3.3	3.4	1.8	2.15	
28	1.3	1.4	2.0	2.8	4.0	3.3	3.2	1.75	2.05	
29	1.3		2.2	2.85	4.1	3.3	2.9	1.7	2.2	
30	1.3		2.4	2.65	4.0	3.2	2.7	1.7	3.55	
31	1.3		2.45		4.1		2.6	1.65		

Daily discharge, in second-feet, of Florida River near Durango, Colo., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	23	20	23	226	226	746	474	178	46	727
2	23	17	20	202	226	716	682	147	40	376
3	23	17	20	178	238	716	667	128	46	232
4	23	17	20	214	303	760	577	111	51	167
5	23	20	20	178	399	804	431	111	51	
6	23	17	23	178	470	818	350	94	46	
7	23	17	20	167	499	774	460	78	40	
8	23	17	23	156	586	774	338	78	40	
9	23	17	23	135	615	818	290	78	64	
10	23	20	31	125	586	818	266	78	128	
11	23	20	46	135	528	818	210	78	46	
12	23	20	40	156	499	789	278	64	40	
13	20	20	46	146	499	687	390	78	51	
14	17	20	51	135	441	745	446	64	51	
15	17	20	51	146	385	695	376	58	58	
16	17	20	51	167	413	620	325	64	51	
17	20	20	64	214	528	516	278	51	46	
18	17	20	72	202	586	557	244	51	40	
19	13	20	80	214	658	600	376	64	40	
20	13	20	80	251	499	554	403	51	51	
21	17	20	80	277	456	668	431	51	40	
22	15	23	88	330	528	638	363	86	40	
23	17	23	80	330	644	562	376	78	51	
24	15	23	72	277	702	531	376	64	51	
25	17	23	80	251	644	500	637	64	46	
26	17	23	80	277	557	396	504	64	102	
27	15	23	80	303	528	376	403	64	120	
28	17	23	97	277	615	376	350	58	102	
29	17		135	290	644	376	278	51	128	
30	17		178	238	615	350	232	51	446	
31	17		190		644		210	46		

Monthly discharge of Florida River near Durango, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	23	15	19	1,172
February	23	17	20	1,111
March	190	20	63	3,896
April	330	125	213	12,645
May	702	226	508	31,262
June	818	350	637	37,880
July	682	210	388	23,843
August	178	46	77	4,734
September	446	40	72	4,268
October 1–4	727	167	376	2,979
The period				123,780

LA PLATA RIVER NEAR LA PLATA, N. MEX.

Location.—At highway bridge in sec. 3, T. 31 N., R. 13 W. New Mexico principal meridian, 1 mile south of La Plata post office. No important tributary between the station and the mouth of the river, 15 miles below.

Records available.—May 25, 1905, to July 21, 1911.

Drainage area.—Approximately 340 square miles.

Gage.—Chain gage; location and datum unchanged.

Channel.—Extremely shifting.

Discharge measurements.—Made from the bridge and by wading.

Winter flow.—Thin ice frequently forms across the stream during the winter and thick ice forms along the shore.

Diversions.—Nearly all the normal flow of the river is diverted above the station during the irrigation season; a few small ditches take water below.

Accuracy.—Measurements insufficient for estimates of discharge.

Cooperation.—During 1911 this station was maintained in cooperation with the Territorial engineer.

Discharge measurements of La Plata River near La Plata, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 23	G. H. Russell	3.54	2.3	Apr. 6	E. O. Christiansen	3.48	156
Feb. 22	do	3.44	4.2	May 29	J. B. Stewart	2.63	19
Mar. 30	C. D. Miller	3.56	140				

Daily gage height, in feet, of La Plata River near La Plata, N. Mex., for 1911.

[Frank Williams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	3.5	4.1	3.75	3.8	3.6	2.6	2.3
2	3.55	4.1	3.75	4.1	3.4	2.6	3.0
3	3.6	4.1	3.75	3.8	3.4	2.5	2.6
4	3.6	3.9	3.75	3.7	3.5	2.5	2.6
5	3.6	3.9	3.75	3.65	3.6	2.5	2.7
6	3.6	3.8	4.4	3.5	3.7	2.5	2.65
7	3.6	3.7	4.2	3.4	3.2	2.5	2.65
8	3.6	3.7	4.2	3.4	3.1	2.7	2.6
9	3.6	3.7	4.25	3.4	3.3	2.6	2.6
10	3.6	3.7	4.4	3.45	3.4	2.6	2.6
11	4.7	3.7	4.5	3.4	3.5	2.6	3.0
12	4.95	3.7	3.4	3.5	3.6	2.6	3.5
13	3.7	3.7	3.4	3.55	3.5	2.6	8.0
14	3.7	3.7	3.1	3.5	3.2	2.9	7.0
15	3.7	3.7	3.0	3.5	3.0	2.95	4.0
16	3.7	3.7	2.9	3.4	3.0	3.0	3.0
17	3.7	3.7	3.1	3.4	2.9	3.0	3.4
18	3.7	3.7	3.15	3.9	2.85	2.9	3.55
19	3.7	3.7	3.2	3.8	2.9	2.9	5.4
20	3.7	3.7	3.1	3.8	2.7	2.8	4.3
21	3.65	3.7	3.3	3.9	2.8	2.8	4.7
22	3.6	3.7	3.3	3.4	2.7	2.75	....
23	3.5	4.1	3.3	3.6	2.6	2.6	....
24	3.5	4.5	3.2	3.6	2.5	2.6	....
25	3.7	3.8	3.3	3.7	2.5	2.5	....
26	3.9	3.7	3.3	3.6	2.5	2.5	....
27	3.9	3.9	3.0	3.8	2.5	2.3	....
28	3.9	3.75	3.1	3.6	2.5	2.25	....
29	3.9	....	3.3	3.6	2.6	2.3	....
30	3.9	....	3.5	3.7	2.6	2.25	....
31	4.1	....	3.7	....	2.6	....	....

WEST MANCOS RIVER NEAR MANCOS, COLO.

Location.—At Crane's ranch, about sec. 14, T. 36 N., R. 13 W., New Mexico principal meridian, 4 miles above Mancos, Colo. Nearest tributary, East Fork, enters 2 miles below.

Records available.—September 18, 1910, to December 5, 1911.

Drainage area.—46 square miles (State engineer's report).

Gage.—Vertical staff.

Channel.—Liable to change during high water.

Discharge measurements.—Made by wading.

Diversions.—No data.

Cooperation.—Station is maintained and records are furnished complete for publication by the State engineer.

Discharge measurements of West Mancos River near Mancos, Colo., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 19	B. S. Clayton	0.93	31.0	June 25	B. S. Clayton	1.48	92.0
Apr. 19	do	1.39	103	Aug. 28	do	1.16	28.2
May 22	do	1.58	133				

Daily gage height, in feet, of West Mancos River near Mancos, Colo., for 1911.

[W. H. Crane, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.2	1.8	1.6	1.45	1.5	0.9	2.35	1.8	1.6
2	1.2	1.8	1.7	1.45	1.4	.9	1.8	1.8	1.6
3	1.2	1.85	1.7	1.45	1.4	.9	1.6	1.75	1.6
4	1.15	1.85	1.7	1.45	1.25	.9	1.5	1.75	1.6
5	1.15	1.9	1.8	1.45	1.25	.85	3.25	1.7	1.6
6	1.2	1.9	1.8	1.4	1.3	.85	2.95	1.7	
7	1.2	2.0	1.8	1.4	1.25	.85	2.55	1.7	
8	1.1	2.0	1.8	1.4	1.25	.85	2.06	1.7	
9	1.1	2.0	1.8	1.4	1.25	.85	2.3	1.7	
10	1.1	1.9	1.8	1.4	1.3	.85	2.2	1.7	
11	1.1	1.85	1.8	1.4	1.25	.85	2.1	1.7	
12	1.1	1.85	1.8	1.6	1.2	.8	2.1	1.7	
13	1.15	1.85	1.8	1.5	1.2	.8	2.0	1.7	
14	1.2	1.85	1.8	1.5	1.2	.8	2.0	1.7	
15	1.2	1.85	1.85	1.45	1.2	.8	2.0	1.7	
16	1.25	1.85	1.9	1.45	1.2	.8	2.0	1.7	
17	1.3	1.85	1.8	1.45	1.2	.8	1.95	1.7	
18	1.35	1.8	1.75	1.45	1.2	.8	1.95	1.7	
19	1.4	1.8	1.65	1.75	1.2	.8	1.9	1.7	
20	1.5	1.7	1.65	1.7	1.2	.8	1.9	1.7	
21	1.5	1.7	1.6	1.7	1.2	.8	1.9	1.7	
22	1.6	1.65	1.6	1.6	1.2	.8	1.9	1.7	
23	1.6	1.65	1.5	1.55	1.1	.8	1.9	1.7	
24	1.6	1.65	1.4	1.5	1.1	.8	1.9	1.65	
25	1.6	1.65	1.4	2.1	1.1	.8	1.85	1.65	
26	1.6	1.6	1.4	1.9	1.1	.8	1.85	1.65	
27	1.65	1.6		1.8	1.15	.9	1.85	1.65	
28	1.65	1.6		1.5	1.1	.95	1.8	1.65	
29	1.7	1.6		2.0	1.1	1.0	1.8	1.6	
30	1.7	1.6	1.45	1.7	1.1	1.95	1.8	1.6	
31		1.65		1.6	1.1		1.8		

Daily discharge, in second-feet, of West Mancos River near Mancos, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	63	197	143	86	96	13	16	72	211	225	86	31	9
2	63	197	169	86	77	13	17	80	211	197	86	31	9
3	63	211	169	86	77	13	18	90	197	183	86	31	9
4	56	211	169	86	52	13	19	99	197	156	153	31	9
5	56	225	197	86	35	11	20	120	169	156	142	31	9
6	63	225	197	77	39	11	21	120	169	143	142	31	9
7	63	253	197	77	35	11	22	143	156	143	118	31	9
8	48	253	197	77	35	11	23	143	156	120	107	24	9
9	48	253	197	77	35	11	24	143	156	99	96	24	9
10	48	225	197	77	39	11	25	143	156	99	252	24	9
11	48	211	197	77	35	11	26	143	143	99	196	24	9
12	48	211	197	118	31	9	27	156	143	96	168	28	13
13	56	211	197	96	31	9	28	156	143	96	96	24	16
14	63	211	197	96	31	9	29	169	143	96	224	24	18
15	63	211	211	86	31	9	30	169	143	86	142	24	114
							31	......	156	......	118	24	......

NOTE.—Discharge interpolated for days for which gage heights are missing. Estimates of the discharge were not made after Oct. 1 on account of changes in the channel after the high water of the first part of October, as no discharge measurements were made after this flood.

Monthly discharge of West Mancos River near Mancos, Colo., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April	169	48	93	5,544
May	253	143	192	11,810
June	225	86	161	9,570
July	252	77	113	6,942
August	96	24	36	2,214
September	114	9	14	843
The period	....	....	....	36,923

VIRGIN RIVER BASIN.

VIRGIN RIVER AT VIRGIN, UTAH.

Location.—Half a mile east of Virgin, Utah, 600 feet below the mouth of North Creek, in sec. 23, T. 41 S., R. 12 W., Salt Lake base and meridian.

Records available.—April 18, 1909, to December 31, 1911.

Drainage area.—1,010 square miles.

Gage.—Inclined staff.

Channel.—Shifting.

Discharge measurements.—Made from cable and car and by wading.

Floods.—Virgin River is subject to occasional short but severe floods.

Winter flow.—Some ice occasionally forms at this station during the winter months.

Diversions.—No important diversions above the station; records show very closely the total run-off of the Virgin River basin above this point.

Accuracy.—Poor, because of shifting character of stream bed and lack of discharge measurements.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Virgin River at Virgin, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 12	G. C. Baldwin	3.99	647
Sept. 27	J. C. Dort	3.65	380
28	.....do	3.14	211

Daily gage height, in feet, of Virgin River at Virgin, Utah, for 1911.

[Niles Earl, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			3.3		4.65	3.45		2.95	2.7	3.65	2.65	
2	3.2	3.4				3.5	2.9	2.95	2.75		2.6	2.6
3		3.3	3.3	4.6	4.4			2.9	2.75			2.6
4	3.25	3.5		4.7	4.65	3.4	2.85		2.75	3.6	2.6	2.6
5	3.15			4.2			2.85	2.75			2.6	2.65
6	3.15	3.4	3.2	4.45	4.4	3.35		2.75	2.75	2.7	2.65	2.6
7	3.1	3.2			4.45	3.3	2.8			2.7		
8		3.25	3.4	4.1	4.65				2.7	2.65	2.65	2.6
9	3.2	3.3	8.2				2.75	2.7	2.8	2.65		
10	3.25	3.2	5.5	4.3	4.2		2.75	2.7			2.6	
11	5.0			4.45		3.2		2.65		2.7	2.65	2.6
12		3.4			4.0		2.8		2.8	2.75	2.5	
13	3.0		3.8	4.15	4.0	3.15	2.85					2.65
14	2.9	3.5		4.1	4.2	3.4	2.85	2.7	2.75	2.7		2.6
15		3.3	3.5	3.6	4.0					2.7	2.6	2.65
16	3.4	3.3	3.6	3.95		3.25	2.85	2.65	2.8			
17			3.7	4.1	4.0		2.9		2.75	2.7	2.6	
18	2.8	3.4	3.7	4.25		3.2		2.7			2.6	2.6
19	2.9			4.5			10.3	2.7	2.7	2.7		2.7
20	3.0	3.35	3.85		3.95	3.1	3.65	2.65			2.65	2.7
21		3.3		4.6	3.95	3.0	3.6		2.85	2.65		
22	2.9	3.25	3.95	4.1				2.7	2.8	2.7	2.65	2.65
23		3.3	4.1			3.0	3.35		2.75			
24	3.1	3.3			3.85		3.2	2.7	2.7		2.6	2.6
25	9.0	3.25	4.2	4.45		3.0		2.7	2.75	2.75	2.6	
26	3.7	3.4	4.2	4.65		3.0	3.0	2.7	2.7			2.6
27		3.4	4.0	4.5	3.8	2.95	2.95	2.8	3.65	2.65	2.6	2.6
28	3.2	3.5		4.2	3.8	2.95		2.7	3.14	2.7		2.55
29	3.0		4.3	4.15			3.0				2.6	2.6
30	5.0				3.6	2.9		2.7	11.0	2.6	2.65	2.65
31	10.0		4.25									

Daily discharge, in second-feet, of Virgin River at Virgin, Utah, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	170	500	254	950	1,280	300	160	170	126	420	144	140
2	175	284	254	1,100	1,160	316	160	170	134	410	136	136
3	184	254	254	1,230	1,030	300	156	160	134	400	136	136
4	194	316	240	1,330	1,280	284	151	147	134	395	136	136
5	148	300	230	830	1,160	276	151	134	134	274	136	144
6	148	284	226	1,080	1,030	269	146	134	134	152	144	136
7	140	226	255	908	1,080	254	142	130	130	152	144	136
8	158	240	284	735	1,280	245	138	128	126	144	144	136
9	175	254	6,350	832	1,060	235	134	126	142	144	140	136
10	194	226	2,350	930	830	230	134	126	142	148	136	136
11	1,700	255	700	1,080	738	226	138	120	142	152	144	136
12	175	284	500	931	645	220	142	122	142	160	122	140
13	112	300	482	782	645	214	151	124	138	156	128	144
14	88	316	399	735	830	284	151	126	134	152	132	136
15	172	254	316	356	645	262	151	123	138	152	136	144
16	256	254	356	604	645	240	151	120	142	152	136	140
17	164	269	414	735	645	233	160	123	134	152	136	138
18	72	284	414	880	630	226	200	126	130	152	136	136
19	88	276	468	1,130	615	214	9,500	126	126	152	140	152
20	112	269	522	1,180	604	202	385	120	138	148	144	152
21	100	254	562	1,230	604	180	356	123	151	144	144	148
22	88	240	604	735	580	180	312	126	142	152	144	144
23	114	254	735	850	550	180	269	126	134	156	140	140
24	140	254	782	970	522	180	226	126	126	158	136	136
25	7,550	240	830	1,080	500	180	203	126	134	160	136	136
26	414	284	830	1,280	490	180	180	126	126	152	136	136
27	320	284	645	1,130	482	170	170	142	385	144	136	136
28	226	316	788	830	482	170	175	126	211	152	136	129
29	180		930	782	418	165	180	126	400	144	136	136
30	1,700		905	900	354	160	175	126	10,600	136	144	144
31	9,050		880		327		170	126		140		140

NOTE.—Daily discharge determined from three fairly well defined rating curves which meet at gage height 3.9; above gage height 3.9 the curve is applicable Jan. 1 to Dec. 31.

Monthly discharge of Virgin River at Virgin, Utah, for 1911.

[Drainage area, 1,010 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	9,050	72	791	0.783	0.90	48,600	C.
February		226	278	.275	.29	15,400	B.
March	6,350	226	766	.758	.87	47,100	B.
April	1,330	356	938	.929	1.04	55,800	B.
May	1,280		746	.739	.85	45,900	B.
June	316	160	226	.224	.25	13,400	B.
July	9,500	134	484	.479	.55	29,800	B.
August	170	120	131	.130	.15	8,060	B.
September	10,600	126	504	.499	.56	30,000	C.
October	420	130	189	.187	.22	11,600	C.
November	144	122	138	.137	.15	8,210	C.
December	152	129	144	.143	.16	8,850	C.
The year	10,600	72	446	.442	5.99	323,000	

SANTA CLARA CREEK NEAR CENTRAL, UTAH.

Location.—At R. H. Hunt's ranch, in sec. 14, T. 39 S., R. 16 W. Salt Lake base and meridian, 6 miles below Pine Valley, and about 1 mile southeast of Central post office.

Records available.—April 21, 1909, to December 31, 1911.

Drainage area.—84 square miles.

Gage.—Vertical staff.

Channel.—Shifts during flood stages.

Discharge measurements.—Made by wading at low stages and from a footbridge at high stages.

Winter flow.—Ice affects relation of gage height to discharge slightly at times during the winter months.

Diversions.—The Eightmile Flat canal, which has a maximum capacity of 3.5 second-feet, is the only diversion above the station.

Accuracy.—Fair except for periods of shifting channel.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Santa Clara Creek near Central, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 14	G. C. Baldwin	4.08	80.3	Sept. 30	J. C. Dort	4.32	109
15	do	4.12	76.2	30	do	4.14	102
Sept. 29	J. C. Dort	3.32	12.3	30	do	4.85	389

Daily gage height, in feet, of Santa Clara Creek near Central, Utah, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.2	4.1	3.35	4.0	3.8	3.95	3.5	3.4	3.3	3.8	3.3	3.3
2	3.15	3.8	3.35	4.0	3.85	3.95	3.5	3.35	3.3	3.7	3.3	3.3
3	3.15	3.75	3.35	4.1	3.85	3.95	3.5	3.3	3.25	3.6	3.3	3.3
4	3.15	3.75	3.6	4.2	3.85	3.95	3.5	3.35	3.25	3.6	3.3	......
5	3.2	3.7	3.4	4.1	3.95	3.95	3.5	3.35	3.25	3.6	3.3	3.3
6	3.2	3.65	3.45	4.1	4.1	3.95	3.5	3.35	3.25	3.5	3.3	......
7	3.2	3.55	3.45	4.0	4.2	3.95	3.5	3.3	3.25	3.45	3.3	3.3
8	3.2	3.4	3.55	4.0	4.3	3.95	3.5	3.3	3.25	3.45	3.3	......
9	3.2	3.45	4.0	4.0	4.3	3.95	3.5	3.3	3.25	3.45	3.3	3.3
10	4.9	3.5	4.65	4.0	4.25	3.95	3.45	3.25	3.25	3.45	3.3	3.3
11	......	3.5	4.3	4.0	4.15	3.8	3.45	3.3	3.25	3.45	3.3	......
12	......	3.45	3.9	3.95	4.1	3.8	3.45	3.3	3.3	3.45	3.3	3.2
13	......	3.45	3.8	3.9	4.1	4.1	3.45	3.3	3.3	3.45	3.3	3.2
14	3.2	3.4	3.7	3.8	4.1	4.1	3.45	3.3	3.3	3.45	3.3	......
15	3.2	3.4	3.7	3.8	4.06	4.05	3.45	3.3	3.3	3.45	3.3	......
16	3.2	3.45	3.65	3.75	4.0	4.05	3.45	3.25	3.3	3.4	3.3	3.3
17	3.2	3.5	3.75	3.7	4.0	4.0	3.45	3.25	3.3	3.4	3.3	3.3
18	3.2	3.4	3.7	3.7	3.95	3.9	3.58	3.25	3.3	3.35	3.3	......
19	3.2	3.4	3.75	3.75	3.95	3.9	3.5	3.25	3.3	3.35	3.3	3.2
20	3.2	3.4	3.75	3.75	4.0	3.9	3.5	3.25	3.3	3.35	3.3	3.2
21	3.15	3.35	3.75	3.8	4.0	3.9	3.65	3.3	3.3	3.35	3.3	3.2
22	3.2	3.3	3.75	3.8	4.0	3.85	3.5	3.3	3.3	3.35	3.3	......
23	3.3	3.3	3.8	3.8	4.0	3.8	3.5	3.3	3.3	3.35	3.3	3.2
24	3.3	3.4	3.8	3.8	4.0	3.8	3.5	3.25	3.3	3.35	3.3	......
25	4.1	3.35	3.85	3.8	3.95	3.75	3.5	3.3	3.3	3.35	3.3	3.2
26	3.6	3.35	3.85	3.8	3.9	3.75	3.5	3.3	3.3	3.35	3.3	3.25
27	3.4	3.35	3.9	3.85	3.9	3.65	3.5	3.3	3.3	3.35	3.3	......
28	3.35	3.35	3.9	3.85	3.9	3.6	3.5	3.3	3.3	3.35	3.3	3.25
29	4.0	......	3.9	3.9	3.9	3.55	3.5	3.3	3.3	3.35	3.3	......
30	3.65	......	3.9	3.8	3.9	3.5	3.45	3.3	4.2	3.3	3.3	3.25
31	5.0	......	4.0	......	3.95	......	3.45	3.3	......	3.3	3.3	3.25

Daily discharge, in second-feet, of Santa Clara Creek near Central, Utah, for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7	163	24	66	46	61	23	17	12	57	12	12
2	7	96	24	66	51	61	23	14	12	46	12	12
3	7	87	24	78	51	61	23	12	10	36	12	12
4	7	87	61	91	51	61	23	14	10	36	12	12
5	7	78	31	78	61	61	23	14	10	36	12	12
6	7	70	38	78	78	61	23	14	10	27	12	12
7	7	53	38	66	91	61	23	12	10	23	12	12
8	7	31	53	66	106	61	23	12	10	23	12	12
9	7	38	66	66	106	61	23	12	10	23	12	12
10	406	45	184	66	98	61	20	10	10	23	12	12
11	200	45	106	66	84	46	20	12	10	23	12	10
12	50	38	56	61	78	46	20	12	12	23	12	8
13	20	38	46	56	78	78	20	12	12	23	12	8
14	7	31	38	46	78	78	20	12	12	23	12	8
15	7	31	38	46	68	72	20	12	12	23	12	10
16	7	38	34	42	66	72	20	10	12	19	12	12
17	7	45	42	38	66	66	20	10	12	19	12	12
18	7	31	38	38	61	56	29	10	12	16	12	10
19	7	31	42	42	61	56	23	10	12	16	12	8
20	7	31	42	42	66	56	23	10	12	16	12	8
21	7	24	42	46	66	56	34	12	12	16	12	8
22	7	18	42	46	66	51	23	12	12	16	12	8
23	18	18	46	46	66	46	23	12	12	16	12	8
24	18	31	46	46	66	46	23	10	12	16	12	8
25	163	24	51	46	61	42	23	12	12	16	12	8
26	61	24	51	46	56	42	23	12	12	16	12	10
27	31	24	56	51	56	34	23	12	12	16	12	10
28	24	24	56	51	56	30	23	12	12	16	12	10
29	139	......	56	56	56	26	23	12	12	16	12	10
30	70	......	56	46	56	23	20	12	114	12	12	10
31	440	......	66	......	61	......	20	12	......	12	......	10

NOTE.—Daily discharge determined from two fairly well defined rating curves, one applicable Jan. 1 to Mar. 8 and Oct. 1 to Dec. 31, and the other Mar. 9 to Sept. 29. Discharge Sept. 30 determined by indirect method for shifting channels.

Monthly discharge of Santa Clara Creek near Central, Utah, for 1911.

[Drainage area, 84 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	440	7	57.0	0.679	0.78	3,500	C.
February	163	18	46.2	.550	.57	2,570	B.
March	184	24	51.4	.612	.71	3,160	B.
April	91	38	55.9	.665	.74	3,330	B.
May	106	46	68.1	.811	.94	4,190	B.
June	78	23	54.4	.648	.72	3,240	B.
July	29	20	22.6	.269	.31	1,390	B.
August	17	10	12.0	.143	.16	738	B.
September	114	10	14.8	.176	.20	881	B.
October	57	12	22.5	.268	.31	1,380	B.
November	12	12	12.0	.143	.16	714	B.
December	12	8	10.1	.120	.14	621	B.
The year	440	7	35.5	.424	5.74	25,700	

SANTA CLARA CREEK NEAR ST. GEORGE, UTAH.

Location.—About 2 miles west of St. George and 3 miles above mouth of creek, in sec. 27, T. 42 S., R. 16 W. Salt Lake base and meridian.

Records available.—April 16, 1909, to December 31, 1911.

Drainage area.—540 square miles.

Gage.—Inclined staff.

Channel.—Shifting.

Discharge measurements.—Made from cable and car or by wading.

Winter flow.—Ice affects relation of gage height to discharge at times during the winter months.

Diversions.—The Bloomington and Seep canals divert water from Santa Clara Creek below the station; except for these canals the records indicate the amount of unappropriated water flowing from Santa Clara Creek into Virgin River.

Accuracy.—Records for 1911, except discharge measurements, withheld until additional data can be obtained.

Cooperation.—Maintained in cooperation with the State of Utah.

Discharge measurements of Santa Clara Creek near St. George, Utah, in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 11	G. C. Baldwin	3.82	80.45
Sept. 25	J. C. Dort	4.57	3.67

BILL WILLIAMS RIVER NEAR SWANSEA, ARIZ.

Location.—In the canyon 1 mile below Planet mine, 9 miles northwest of Swansea, and 28 miles north of Bouse.

Records available.—September 26, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Staff gage in four sections; the two low-water sections are on the right bank a short distance above the cable; the remainder of the gage is bolted to cliffs on the left bank just above the cable.

Channel.—Shifting sand.

Discharge measurements.—Made from car and cable just below gage and by wading.

Accuracy.—Discharge measurements insufficient for estimates of daily discharge.

Discharge measurements of Bill Williams River near Swansea, Ariz., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 5	C. C. Jacob	3.70	25
Oct. 21	.....do	3.65	15

Daily gage height, in feet, of Bill Williams River near Swansea, Ariz., for 1911.

[L. G. Martinez, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.5	3.1	3.2	3.7	3.7	....	3.7	3.7	3.7	3.6	3.6
2	2.5	3.2	3.2	3.7	3.7	....	3.7	3.7	3.9	3.5	3.6
3	2.5	3.4	3.1	3.7	3.7	....	3.7	3.7	3.9	3.5	3.6
4	2.5	3.5	3.1	3.7	3.7	....	3.7	3.7	3.7	3.5	3.6
5	2.5	....	3.1	3.7	3.7	....	3.7	3.7	3.7	3.5	3.6
6	2.5	....	3.5	3.7	3.7	....	3.7	3.7	4.6	3.5	3.6
7	2.4	4.2	3.6	3.7	3.7	....	3.7	3.7	3.9	3.5	3.6
8	2.4	4.0	3.7	3.7	3.7	....	3.7	3.7	3.9	3.4	3.6
9	2.4	3.8	3.6	3.7	3.7	....	3.7	3.7	3.7	3.4	3.6
10	2.4	3.8	3.5	3.7	3.7	....	3.7	3.7	3.7	3.4	3.6
11	2.4	3.6	3.4	3.7	3.7	....	3.7	3.7	3.6	3.4	3.6
12	....	3.5	....	3.7	3.7	....	3.7	3.7	3.6	3.5	3.6
13	....	3.5	....	3.7	3.7	....	3.7	3.7	3.6	3.5	3.6
14	....	3.4	4.3	3.7	3.7	....	3.7	3.7	3.6	3.5	3.5
15	3.3	3.4	4.1	3.7	3.7	....	3.7	3.7	3.6	3.5	3.5
16	....	3.4	4.0	3.7	3.7	....	3.7	3.7	3.6	3.5	3.5
17	....	3.3	4.0	3.7	3.7	....	3.7	3.7	3.6	3.5	3.45
18	3.0	3.3	3.9	3.7	3.7	....	3.7	3.7	3.6	3.5	3.45
19	3.0	3.3	3.9	3.7	3.7	2.7	3.7	3.7	3.6	3.6	3.45
20	3.0	3.3	3.2	3.7	3.7	3.3	3.7	3.7	3.6	3.6	3.45
21	3.0	3.2	3.8	3.7	3.7	4.4	3.7	3.7	3.6	3.6	3.45
22	3.0	3.2	3.8	3.7	3.7	4.1	3.7	3.7	3.6	3.6	3.45
23	3.0	3.2	3.8	3.7	3.7	3.8	3.7	3.7	3.6	3.6	3.45
24	3.0	3.2	3.8	3.7	3.7	4.0	3.7	3.7	3.6	3.6	3.45
25	3.0	3.2	3.7	3.7	3.7	4.2	3.7	3.7	3.6	3.6	3.45
26	3.0	3.2	3.7	3.7	3.7	4.1	3.7	3.7	3.6	3.6	3.35
27	3.0	3.2	3.7	3.7	3.6	4.0	3.7	3.7	3.6	3.6	3.15
28	3.3	3.2	3.7	3.7	3.6	3.8	3.7	3.7	3.8	3.6	3.15
29	3.3	....	3.7	3.7	3.6	3.7	3.7	3.7	3.8	3.6	3.15
30	3.3	....	3.7	3.7	3.6	3.7	3.7	3.7	3.7	3.6	3.05
31	3.3	....	3.7	....	....	3.7	3.7	....	3.6	....	3.05

GILA RIVER BASIN.

GILA RIVER NEAR REDROCK, N. MEX.

Location.—Four miles northeast of Redrock post office, near the eastern edge of T. 18 N., R. 18 W., New Mexico principal meridian, in the Middle Box Canyon. Nearest important tributary is Mancos Draw, an intermittent stream which enters 12 miles above the station. A number of large washes come into the river above and below the station, and during flood stages carry large quantities of water.

Records available.—May 14, 1908, to December 31, 1911.

Drainage area.—3,500 square miles (measured from Land Office map).

Gage.—Automatic recording gage. The original staff gage was located at the mouth of the canyon. On July 16, 1909, readings on this gage were discontinued and a Friez automatic gage, reading to a new datum was installed at the present site. The Friez gage was washed out by the flood of July 23, 1911, and a Barrett and Lawrence automatic gage, reading to the same datum, was established in its place October 3, 1911, but was not put into operation until December 1, 1911. All gage heights July 23, to November 30, 1911, were read on a staff gage attached to the automatic float box and refer to the datum of the automatic gages.

Channel.—Extremely shifting.

Discharge measurements.—Made from car and cable 400 feet below the gage, and at low stage by wading.

Winter flow.—Except for a fringe of ice along the edges of the river, ice does not interfere with the accuracy of the results.

Diversions.—A number of large irrigation ditches and reservoirs divert water above the station.

Flood flow.—On July 23, 1911, a very severe flood occurred in the valley. Owing partly to a log jam the maximum stage at the station was about 22 feet with a discharge of about 18,000 second-feet.

Accuracy.—Owing to the extremely shifting character of the channel and to lack of sufficient discharge measurements, reliable estimates of discharge for 1911 can not be made.

Cooperation.—Station maintained in cooperation with the Territorial engineer and Thomas Lyons, Gila, N. Mex.

Discharge measurements of Gila River near Redrock, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 2	C. D. Miller	2.48	206	Aug. 15	G. H. Russell	0.25	38.0
Mar. 27	G. H. Russell	3.60	855	Nov. 28	A. S. Kirkpatrick	.50	95.0
May 25	.....do	1.70	82.3				

Daily gage height, in feet, of Gila River near Redrock, N. Mex., for 1911.

[R. A. Jernigan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Nov.	Dec.
1	1.8			3.2	1.85	1.5	1.6				0.95
2	1.8	2.48		3.2	1.85	1.5	1.6		1.6		.95
3	1.8			3.1	1.8	1.55	1.6				1.2
4	1.75	1.5	3.3	3.1	1.75	1.5	1.6				1.2
5	1.75		3.45	3.0	1.7	1.5	1.6		.5		1.2
6	1.7		4.1	2.9	1.7	1.5	1.6				1.2
7	1.7		4.0	2.9	1.9	1.5	1.6		.85		1.2
8	1.7		4.0	2.85	1.8	1.5	1.6				1.2
9	1.7		3.5	2.85	1.8	1.5	1.6		8.0		1.2
10	1.7		3.2	2.9	1.85	1.45	2.0				1.2
11	1.8	2.1	3.0	2.9	1.85	[a]3.0	[b]3.2		6.4		1.2
12	3.0		3.05	2.9	1.85	1.8	2.9	1.0			1.2
13	3.0		3.0	2.85	1.9	1.75	3.4				1.2
14	3.0		3.0	2.75	1.9	1.7	3.4	.3			1.2
15			3.0	2.55	1.9	1.7	3.1	.25			1.2
16			2.9	2.5	1.85	1.7	2.75		1.5		1.2
17			2.9	2.5	1.85	1.65	3.0	2.0			1.2
18		2.0	2.9	2.4	1.8	1.6	2.7		2.0		1.2
19			2.85	2.3	1.8	1.6	2.75	4.0			1.2
20			2.85	2.25	1.8	1.6	2.6				1.2
21			2.85	2.25	1.8	1.6	2.55		1.8		1.2
22			2.85	2.2	1.75	1.95	2.65	2.0			1.1
23			3.0	2.15	1.75	1.8			1.6		1.0
24			3.5	2.1	1.7	1.7		2.4			.8
25		2.2	3.5	2.1	1.7	1.65		4.0	1.7		1.0
26			3.75	2.1	1.65	1.6		2.0	2.0		1.0
27			3.65	2.1	1.65	1.6					1.0
28	3.0		3.55	2.05	1.55	1.55			1.8	0.5	1.0
29			3.4	1.95	1.6	1.5					1.0
30			3.35	1.9	1.55	1.45			2.0		1.0
31			3.25		1.5						1.0

[a] Maximum gage height, 6.1 feet.

[b] Maximum gage height, 5.0 feet.

NOTE.—Gage heights somewhat affected by ice Jan. 1 to 11 and Dec. 25 to 31.

GILA RIVER AT GUTHRIE, ARIZ.

Location.—About 500 feet above Arizona & New Mexico Railroad bridge at Guthrie, in sec. 3, T. 6 S., R. 30 E., Gila and Salt River base and meridian, 8 miles above mouth of San Francisco River.

Records available.—November 6, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Inclined staff bolted to conglomerate rock on right bank.

Channel.—Shifting sand.

Discharge measurements.—Made from car and cable 50 feet below gage, and by wading.

Diversions.—About 7,000 acres of land irrigated from this stream above the station.

Accuracy.—Full reliance can not be placed in the gage height record previous to November 12, 1911. Discharge measurements during 1911 insufficient for estimates of flow.

Discharge measurements of Gila River at Guthrie, Ariz., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 17	C. C. Jacob	6.02	239	Aug. 28	C. C. Jacob	5.40	197
Mar. 15	.....do	6.70	413	Sept. 22	.....do	5.45	149
Apr. 14	.....do	6.66	146	Nov. 11	.....do	5.70	169
July 12	.....do	7.15	310	Dec. 12	.....do	5.60	130

Daily gage height, in feet, of Gila River at Guthrie, Ariz., for 1911.

[Amelia Short, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.3	5.7	5.95	7.05	6.2	5.9	6.7	5.9	5.4	6.7	6.0	5.55
2	5.3	6.0	6.9	7.1	6.2	5.9	6.5	5.75	5.3	6.6	5.9	5.54
3	5.3	6.0	7.0	7.2	6.2	5.9	6.35	5.55	5.3	6.6	5.9	5.52
4	5.3	6.0	7.15	7.1	6.1	5.9	6.2	5.45	5.3	6.5	5.9	5.56
5	5.3	6.0	7.1	7.05	6.1	5.9	6.2	5.4	5.05	6.6	5.9	5.57
6	5.3	5.9	7.1	7.0	6.1	5.9	6.1	5.3	5.0	7.15	5.9	5.57
7	5.3	5.9	7.8	6.95	6.1	5.9	6.0	5.25	5.0	8.0	5.9	......
8	5.3	5.9	7.7	6.9	6.0	5.9	6.0	5.15	5.0	6.55	5.8	......
9	5.3	5.9	7.5	6.85	6.0	5.9	6.0	5.1	5.0	6.3	5.75	5.60
10	5.3	5.9	7.7	6.9	6.0	5.9	6.15	5.1	7.9	6.0	5.7	5.61
11	5.3	5.9	7.7	6.8	5.95	6.6	6.8	5.0	6.7	5.9	5.68	5.60
12	5.4	5.9	7.0	6.75	5.95	6.8	7.4	5.0	6.05	5.8	5.70	5.60
13	5.85	5.9	7.0	6.7	5.95	6.6	7.75	5.0	5.6	5.7	5.66	5.61
14	5.65	5.8	7.0	6.65	5.95	6.7	7.6	5.0	5.5	5.6	5.66	5.60
15	5.9	5.7	6.7	6.65	5.9	6.5	7.85	5.0	5.8	5.6	5.66	5 60
16	5.9	5.6	6.65	6.6	5.9	6.5	7.75	5.0	5.45	5.6	5.67	5.60
17	5.9	5.6	6.4	6.7	5.9	6.4	7.85	4.8	5.3	5.5	5.68	5.59
18	5.9	5.6	6.4	6.65	5.9	6.4	7.55	4.6	5.25	5.5	5.64	5.58
19	5.7	5.9	6.5	6.55	5.9	6.4	7.9	4.6	5.2	5.5	5.62	5.58
20	5.6	5.9	6.4	6.4	5.9	6.4	7.95	4.6	6.85	5.5	5.64	5.56
21	5.7	5.9	6.25	6.4	5.9	6.3	7.75	4.55	6.4	5.4	5.62	5.56
22	5.7	5.9	6.2	6.3	5.9	6.35	7.6	4.55	5.5	5.5	5.60	5.56
23	5.7	5.9	6.3	6.2	5.9	6.2	7.4	5.15	5.4	5.5	5.60	5.56
24	5.7	5.9	6.4	6.2	5.9	6.25	9.8	5.25	5.4	5.5	5.59	5.57
25	5.8	5.9	6.8	6.1	5.9	6.2	10.8	5.45	5.4	5.5	5.59	5.57
26	7.05	5.9	7.3	6.1	5.9	6.15	6.6	5.85	5.4	5.4	5.59	5.57
27	6.8	5.9	7.35	6.1	5.9	6.1	6.95	5.55	5.6	5.5	5.58	5.57
28	7.0	5.9	7.4	6.15	5.9	6.1	6.7	5.4	5.6	5.5	5.56	5.56
29	6.3	......	7.35	6.1	5.9	6.1	6.45	5.4	5.5	6.4	5.56	5.56
30	6.3	......	7.3	6.2	5.9	6.0	6.25	5.75	5.6	5.9	5.54	5.55
31	6.3	......	7.2	......	5.9	6.7	6.0	5.45	......	5.9	......	5.55

GILA RIVER AT SAN CARLOS, ARIZ.

Location.—Below Arizona & Eastern Railroad bridge on San Carlos Indian Reservation, about 1 mile east of San Carlos, and one-half mile above mouth of San Carlos River.

Records available.—1899 to 1905 at a point about 1 mile below present site; August 17, 1910, to February 5, 1911, when station was discontinued.

Drainage area.—Not measured.

Gage.—Vertical staff fastened to west pier of railroad bridge. On September 7, 1910, a staff gage was installed at old trestle bent, 600 feet below bridge, at an independent datum. The relation between these gages has been established and all gage heights are referred to the datum of the new gage.

Channel.—Shifting sand.

Discharge measurements.—Made from railroad bridge and by wading.

Accuracy.—Estimates of discharge not prepared, as results have not been satisfactory.

Daily gage height, in feet, of Gila River at San Carlos, Ariz., for 1911.

[J. B. Stone, observer.]

Day.	Jan.	Feb.	Day.	Jan.	Feb.	Day.	Jan.	Feb.
1	11.0	11.8	11	11.25	....	21	11.8	....
2	11.0	11.8	12	11.6	....	22	11.8	....
3	11.0	11.8	13	11.9	....	23	11.8	....
4	11.0	11.8	14	12.2	....	24	11.8	....
5	11.0	11.7	15	12.0	....	25	11.8	....
6	11.0	....	16	12.0	....	26	11.8	....
7	11.0	....	17	11.9	....	27	11.8	....
8	11.0	....	18	11.8	....	28	11.8	....
9	11.0	....	19	11.8	....	29	11.8	....
10	11.0	....	20	11.8	....	30	11.8	....
						31	11.8	....

GILA RIVER AT KELVIN, ARIZ.

Location.—About half a mile below mouth of Mineral Creek, 1 mile below Kelvin, Ariz.,[1] and 25 miles above Florence, Ariz.

Records available.—January 26 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Inclined staff bolted to basalt ledge on right bank opposite observer's home. This gage was destroyed by the March flood and was replaced by painting the section directly on the rock about 10 feet downstream from original gage. On November 23 an inclined staff for low water was bolted to the rock to which the first gage was attached. The original datum has been maintained.

Channel.—Shifting sand.

Discharge measurements.—Made from the public car and cable about three-fourths of a mile above gage, and by wading.

Diversions.—About 7,000 acres of land irrigated from this stream above the station.

Accuracy.—Although channel shifts, the control is fairly permanent between floods. Results are considered good for a station of this type. Estimates have been prepared from curves covering periods between floods.

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[1] Ray Junction on Arizona & Eastern Railroad.

Discharge measurements of Gila River at Kelvin, Ariz., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 27	C. C. Jacob	4.60	490	Sept. 12	C. C. Jacob	3.98	50
Feb. 17	.....do	4.50	460	Oct. 5	.....do	5.79	1,080
Mar. 22	.....do	4.90	576	6	.....do	6.20	1,600
Apr. 25	.....do	4.00	71	30	.....do	7.18	3,920
May 24	.....do	3.70	6.6	Nov. 24	.....do	4.71	211
July 26	.....do	10.05	12,700	Dec. 20	.....do	4.79	272
27	.....do	7.05	3,560				

Daily gage height, in feet, of Gila River at Kelvin, Ariz., for 1911.

[H. Measom, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		4.55	4.4	5.05	4.0	3.5	4.0	5.4	3.9	5.3	5.95	4.5
2		4.5	4.5	5.0	4.0	3.5	4.0	4.9	3.8	5.4	5.8	4.5
3		4.4	4.7	5.0	3.9	3.5	3.8	4.65	3.6	5.2	5.5	4.5
4		5.15	5.0	5.0	3.9	3.5	3.7	4.5	4.25	5.2	5.4	4.5
5		5.65	5.05	4.9	3.9	3.5	3.7	4.5	4.65	5.65	5.35	4.5
6		4.95	7.5	4.9	3.9	3.5	3.6	4.5	4.3	7.0	5.3	4.4
7		4.6	8.0	4.8	3.9	3.5	3.6	4.55	4.0	7.25	5.3	4.4
8		4.75	8 0	4.7	3.9	3.5	3.5	4.7	3.8	6.9	5.25	4.4
9		4.6	7.5	4.7	3.9	3.5	3.35	4.6	3.6	6.15	5.1	4.4
10		4.5	7.5	4.7	3.9	3.5	3.05	4.55	3.5	5.6	5.1	4.4
11		4.45	6.75	4.7	3.8	3.5	2.9	4.5	3.4	5.5	5.0	4.4
12		4.4	6.0	4.6	3.8	3.5	3.4	4.45	3.95	5.25	5.0	4.4
13		4.4	5.9	4.5	3.8	3.5	5.15	4.4	5.25	5.2	5.0	4.4
14		4.35	5.85	4.45	3.8	4.3	5.0	4.4	5.9	5.2	4.9	4.45
15		4.3	5.8	4.4	3.8	4.2	4.8	4.4	7.2	5.15	4.8	4.5
16		4.45	5.8	4.4	3.8	4.2	5.0	4.3	5.95	5.1	4.8	4.6
17		4.5	5.7	4.3	3.75	4.0	6.5	4.3	5.65	5.0	4.8	4.6
18		4.5	5.7	4.3	3.7	3.95	6.35	4.2	5.6	5.0	4.7	4.7
19		4.7	5.7	4.2	3.7	3.85	6.55	4.2	5.75	5.0	4.6	4.8
20		4.8	5.6	4.2	3.65	3.8	6.1	4.15	5.9	5.0	4.5	4.75
21		4.75	5.3	4.2	3.6	3.7	6.85	4.0	5.4	5.0	4.5	4.7
22		4.65	5.0	4.2	3.6	3.85	6.35	5.0	5.55	5.0	4.5	4.7
23		4.6	4.85	4.2	3.6	3.7	5.75	4.9	5.2	4.9	4.55	4.7
24		4.5	4.95	4.2	3.6	3.7	5.4	4.5	4.95	4.9	4.7	4.7
25		4.5	5.0	4.1	3.6	3.7	5.4	4.25	4.8	4.8	4.7	4.8
26	4.5	4.5	4.9	4.0	3.6	3.65	9.8	4.0	4.7	4.8	4.7	4.9
27	4.55	4.4	4.9	4.0	3.6	3.5	7.75	5.0	4.5	4.85	4.6	4.9
28	4.65	4.45	5.15	4.0	3.55	3.1	7.25	5.3	4.8	5.25	4.6	4.9
29	4.5		5.3	4.0	3.5	2.85	6.3	4.65	5.35	6.05	4.6	4.8
30	4.7		5.25	4.0	3.5	3.35	5.85	4.3	5.5	7.05	4.6	4.8
31	4.7		5.2		3.5		5.6	4.0		6.95		4.7

Daily discharge, in second-feet, of Gila River at Kelvin, Ariz., for 1911.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		470	380	695	64	4	64	1,000	38	575	1,240	145
2		440	440	655.	64	4	64	575	21	655	1,060	145
3		380	570	655	38	4	21	390	7	500	740	145
4		935	800	655	38	4	12	290	159	500	655	145
5		1,420	845	575	38	4	12	290	390	885	615	145
6		760	4,720	575	38	4	7	290	180	3,220	575	120
7		500	6,070	500	38	4	7	322	64	3,900	575	120
8		605	6,070	425	38	4	4	425	21	2,980	538	120
9		500	4,640	425	38	4	2	355	7	1,520	430	120
10		440	4,640	425	38	4	0	322	4	830	430	120
11		410	2,930	425	21	4	0	290	8	740	365	120
12		380	1,680	355	21	4	8	260	51	538	365	120
13		380	1,550	290	21	4	778	230	865	500	365	120
14		350	1,490	260	21	180	655	230	1,550	500	310	132
15		320	1,430	230	21	138	500	230	3,800	465	300	145

Daily discharge, in second-feet, of Gila River at Kelvin, Ariz., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	....	410	1,430	230	21	138	655	180	1,240	430	260	175
17	....	440	1,310	180	16	64	2,460	180	885	365	260	175
18	....	440	1,310	180	12	51	2,210	138	830	365	215	215
19	....	570	1,310	138	12	30	2,550	138	1,000	365	175	260
20	....	640	1,200	138	10	21	1,820	119	1,180	365	145	238
21	....	605	910	138	7	12	2,210	64	655	365	145	215
22	....	535	655	138	7	30	2,210	655	785	365	145	215
23	....	500	538	138	7	12	1,370	575	500	310	160	215
24	....	440	615	138	7	12	1,000	290	338	310	215	215
25	....	440	655	100	7	12	1,000	159	260	260	215	260
26	440	440	575	64	7	10	11,800	64	215	260	215	310
27	470	380	575	64	7	4	5,340	655	145	285	175	310
28	535	410	778	64	6	1	4,010	910	260	538	175	310
29	440	....	910	64	4	0	2,130	390	615	1,380	175	260
30	570	....	865	64	4	2	1,490	180	740	3,350	175	260
31	570	....	820	....	4	....	1,200	64	....	3,100	....	215

NOTE.—Daily discharge determined from three fairly well defined rating curves applicable Jan. 26–Mar. 8, Mar. 9–Sept. 15, and Sept. 16–Dec. 31, respectively.

Monthly discharge of Gila River near Kelvin, Ariz., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January 26-31	570	440	504	6,000	B.
February	1,420	320	519	28,800	B.
March	6,070	380	1,700	105,000	B.
April	695	64	299	17,800	B.
May	64	4	21.8	1,340	C.
June	180	0	25.6	1,520	D.
July	11,800	0	1,470	90,400	C.
August	1,000	64	331	20,400	B.
September	3,890	3	563	33,500	B.
October	3,900	260	991	60,900	B.
November	1,240	145	379	22,600	B.
December	310	120	187	11,500	B.
The period	....	....	....	400,000	

SAN FRANCISCO RIVER AT ALMA, N. MEX.

Location.—About half a mile southwest of Alma, in sec. 4, T. 11 N., R. 20 W. Nearest tributary, Mineral Creek, enters a short distance above.

Records available.—October 18, 1904, to December 31, 1907; January 1, 1909, to August 12, 1911, when the station was discontinued.

Drainage area.—1,670 square miles (from Land Office map).

Gage.—Vertical staff; site and datum differ somewhat from those of the original gage.

Channel.—Extremely shifting.

Discharge measurements.—Made from car and cable nearby and by wading.

Winter flow.—The flow of this river is practically unaffected by ice.

Diversions.—A few small ditches divert water above the station.

Accuracy.—Owing to the shifting character of the channel and lack of sufficient measurements, estimates of discharge can not be made.

Cooperation.—From its reestablishment in 1909 the station was maintained in cooperation with the Territorial engineer.

Discharge measurements of San Francisco River at Alma, N. Mex., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 30	C. D. Miller	[a] 2.05	37.4
Mar. 29	G. H. Russell	1.90	158

[a] Gage height taken from observer's book.

Daily gage height, in feet, of San Francisco River at Alma, N. Mex., for 1911.

[Louise Graham, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	2.0	2.05	2.0	2.05	1.25	....	1.87	1.65
2	2.0	1.5	2.05	1.95	1.25	....	1.05	1.5
3	2.0	1.95	2.05	1.85	1.2	....	2.25	1.45
4	2.0	1.95	2.05	1.85	1.2	....	1.95	1.2
5	2.0	1.95	3.4	1.85	1.25	....	1.2	1.1
6	2.0	1.95	4.0	1.95	1.2	....	1.1	1.05
7	2.0	2.0	2.8	1.85	1.1	....	1.1	1.05
8	2.0	1.95	2.5	1.9	1.1	....	1.1	1.1
9	2.0	1.95	2.4	1.95	1.15	....	1.05	1.15
10	2.0	1.65	2.4	2.0	1.05	....	1.0	1.1
11	3.5	1.95	2.5	2.0	1.05	....	1.0	1.85
12	2.05	2.05	2.8	1.95	1.05	....	1.05	1.25
13	2.0	1.45	2.35	1.95	1.05	1.7	1.15	....
14	2.0	1.45	2.0	2.0	1.0	1.7	2.15	....
15	2.0	1.45	2.0	1.95	1.05	1.7	2.05	....
16	2.0	1.55	2.05	2.0	1.05	1.7	2.25	....
17	2.0	1.45	2.0	1.95	1.0	1.7	1.95	....
18	2.0	1.5	2.0	1.95	1.05	1.65	2.05	....
19	2.0	2.0	2.8	1.95	1.05	1.5	3.95	....
20	1.4	1.95	2.45	2.0	1.05	1.65	3.65	....
21	1.45	1.95	2.4	1.95	1.05	....	3.0	....
22	2.05	2.0	2.1	1.95	1.0	....	3.95	....
23	2.0	1.85	2.1	1.85	1.0	....	2.05	....
24	2.0	1.95	2.1	1.75	1.05	....	2.25	....
25	2.0	1.85	2.1	1.7	1.05	....	2.85	....
26	2.45	1.8	2.05	1.65	1.0	....	2.9	....
27	2.15	1.75	2.05	1.35	1.05	....	2.05	....
28	2.05	1.95	2.05	1.25	....	....	2.95	....
29	2.05	....	2.05	1.25	....	....	2.05	....
30	2.05	....	2.05	1.2	....	....	1.95	....
31	2.05	....	2.05	....	....	....	1.95	....

NOTE.—No flow on days from Jan. 1 to Aug. 12, for which the gage heights are missing.

SAN FRANCISCO RIVER AT DAM ABOVE CLIFTON, ARIZ.

Location.—At the diversion dam of the Arizona Copper Co., and 6½ miles above junction with Gila River. Station was moved upstream January 16, 1911.

Records available.—October 24, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Painted on inclined crest of dam and on vertical face of right abutment. From October 24, 1910, to January 16, 1911, observations were made on vertical staff fastened to retaining wall on left bank just above the highway bridge at Clifton. On the latter date it was removed to the diversion dam 1½ miles farther upstream. The original gage at the dam was a vertical staff in two sections bolted to the upstream face of dam and right abutment. The vertical staff was damaged by high water, and the painted gage was installed at the same datum November 13, 1911.

Discharge measurements.—Made from highway bridge at Clifton and by wading.

Diversions.—A small amount of water is used for irrigation one-fourth mile above Arizona Copper Co.'s dam. At the dam, about 14 second-feet is diverted to develop power and is returned to the river above the bridge at Clifton.

Accuracy.—The station was moved to the diversion dam because the channel at the bridge is somewhat shifting. On account of frequent repairs to the dam and difficulty of obtaining gage readings the results have not been satisfactory, and estimates of daily or monthly discharge have not been prepared.

Discharge measurements of San Francisco River at dam above Clifton, Ariz., in 1911.

Date.	Hydrographer.	Gage height (bridge).	Measured discharge.	Gage height (dam).	Total discharge at dam.
		Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
Jan. 13	C. C. Jacob	6.02	556		556
16	do	([e])	155	6.98	[a] 167
Feb. 7	do	([e])	276	7.12	[a] 288
Mar. 14	do	([e])	559	7.40	[a] 571
Apr. 13	do	([e])	212	7.00	[a] 224
13	do	([e])	186	7.00	[b] 225
July 10	do	([e])	44	6.88	[a] 56
11	do	5.55	1,240	8.30	1,240
Aug. 25	do	4.45	241	6.95	241
26	do	4.55	313	7.25	313
Sept. 21	do	4.20	119	7.05	[c] 129
Nov. 13	do		115	7.18	[c] 126
Dec. 11	do		81	7.04	[d] 91

[a] Includes 12 second-feet discharge in canal.
[b] Includes 39 second-feet discharge in canal.
[c] Includes 10.4 second-feet discharge in canal.
[d] Includes 9.7 second-feet discharge in canal.
[e] No water at gage.

Daily gage height, in feet, of San Francisco River at Clifton, Ariz., for 1911.

[Peter Riley, observer.]

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	5.6			16			
2	5.55			17			
3	5.4			18			
4	5.4			19			
5	5.4	5.65		20			
6	5.5		5.9	21			
7	5.5		6.0	22			
8	5.5			23			
9	5.5			24			
10	5.55			25			
11	6.05			26			
12	6.5			27			
13	5.9			28			
14	5.7			29			
15				30			
				31			

Daily gage height, in feet, of San Francisco River at dam above Clifton, Ariz., for 1911.

[D. D. Potter and Bee Wilkerson, observers.]

Day.	Jan.	Feb.	Mar.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1					7.10	7.10	7.2	7.1	7.1
2					7.02	7.00	7.05	7.1	7.1
3			6.9		7.00	6.98	7.0	7.1	7.1
4			7.35		6.98	6.98	7.0	7.1	7.1
5			7.9		6.98	6.95	9.1	7.1	7.1
6			9.5		6.98	6.98	8.65	7.1	7.1
7			11.2		6.95	6.90	7.55	7.1	7.1
8			10.0		6.88	6.88	7.35	7.1	7.1
9			9.95		6.85	6.85	7.3	7.1	7.1
10			9.0	6.9	6.92	6.88	7.2	7.1	7.1

Daily gage height, in feet, of San Francisco River at dam above Clifton, Ariz., for 1911—Continued.

Day.	Jan.	Feb.	Mar.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	....	....	7.9	7.28	6.92	6.90	7.1	7.1	7.07
12	....	....	7.9	7.15	6.92	6.98	7.1	7.12	7.1
13	....	6.9	7.5	6.95	6.95	7.02	7.1	7.1	7.1
14	....	6.9	7.5	6.88	7.02	7.10	7.1	7.1	7.1
15	....	6.85	7.4	7.43	7.00	7.68	7.1	7.1	7.1
16	7.0	6.85	7.3	7.15	7.00	8.15	7.1	7.1	7.1
17	6.9	6.9	7.3	8.10	6.88	7.65	7.1	7.1	7.1
18	6.9	7.0	7.2	7.52	6.90	7.00	7.1	7.1	7.1
19	6.9	7.0	7.2	8.20	6.88	7.60	7.1	7.1	7.1
20	6.8	6.95	7.15	7.65	6.90	7.15	7.1	7.1	7.1
21	6.85	6.9	7.1	7.28	6.90	7.05	7.1	7.1	7.1
22	7.2	6.9	7.1	7.28	6.88	7.05	7.1	7.1	7.1
23	7.1	6.9	7.05	7.10	7.05	7.00	7.1	7.1	7.1
24	7.4	6.9	7.3	7.00	6.95	7.00	7.1	7.1	7.1
25	7.3	....	7.7	8.05	7.00	6.95	7.1	7.1	7.1
26	7.1	....	7.6	7.45	7.05	6.95	7.1	7.1	7.1
27	7.0	....	7.6	7.70	7.00	6.95	7.1	7.1	7.1
28	6.9	....	7.55	7.45	7.00	7.00	7.1	7.1	7.1
29	....	....	7.5	7.45	7.00	7.15	10.0	7.1	7.1
30	....	....	7.4	7.20	7.00	7.63	9.1	7.1	7.1
31	....	....	7.35	7.12	7.00	....	8.1	....	7.1

WHITEWATER CREEK NEAR MOGOLLON, N. MEX.

Location.—At the power house of the Socorro Mines Co., 3 miles south of Mogollon, 500 feet below the confluence of north and south forks, in sec. 4, T. 11 S., R. 19 W., below all tributaries.

Records available.—October 1, 1909, to December 31, 1911.

Drainage area.—34 square miles (measured from topographic sheet).

Gage.—Vertical staff gage on right bank, half a mile below the old weir gage, installed May 30, 1911.

Channel.—Fairly permanent except during high water.

Discharge measurements.—Made by wading at nearly all stages.

Winter flow.—Little if any backwater from ice during the winter months.

Diversions.—All water used in the power plant is returned above the gage.

Accuracy.—Owing to the shifting character of the channel during high water and to lack of discharge measurements, no estimates of discharge have been made from the staff gage readings. The estimates made prior to September 30, 1911, are by weir.

Cooperation.—From October 1, 1909, to September 30, 1911, records of daily discharge over a weir installed at this point by the Socorro Mines Co. were kept and furnished through their courtesy.

The following discharge measurement was made by G. H. Russell.

May 30, 1911: Gage height, 1.08 feet (old weir gage read 0.65); discharge, 10.4 second-feet.

Daily gage height, in feet, of Whitewater Creek near Mogollon, N. Mex., for 1911.

[J. P. Warren, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	1.10	1.04	1.12	0.85	1.18	1.75	1.30
2	....	1.05	.84	1.08	.82	1.14	1.58	1.30
3	....	1.00	.84	1.02	.84	1.08	1.40	1.30
4	....	1.03	1.00	1.00	.81	1.00	1.30	1.30
5	....	.90	.94	1.00	.81	2.40	1.30	1.30
6	....	.90	1.04	1.00	.81	2.75	1.30	1.30
7	....	.95	.98	92	.79	2.60	1.30	1.30
8	....	.95	1.02	.92	.78	2.05	1.30	1.30
9	....	.90	1.15	.91	.77	1.80	1.30	1.30
10	....	.90	1.45	.90	.91	1.70	1.30	1.30

Daily gage height, in feet, of Whitewater Creek near Mogollon, N. Mex., for 1911—Con.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	....	.90	1.75	.91	.91	1.60	1.30	1.30
12	....	.95	1.35	.91	.88	1.50	1.30	1.30
13	....	.96	1.35	.90	.88	1.45	1.30	1.20
14	....	.97	1.25	.84	.88	1.35	1.30	1.28
15	....	.88	1.15	.85	.96	1.40	1.30	1.22
16	....	.88	1.10	.85	.88	1.35	1.30	1.30
17	....	.89	1.20	.85	.84	1.25	1.30	1.30
18	....	.83	1.10	.88	.85	1.25	1.30	1.30
19	....	.83	1.10	.86	.86	1.30	1.30	1.30
20	....	.88	1.20	.85	.85	1.30	1.30	1.30
21	....	.87	1.20	.88	.85	1.30	1.25	1.30
22	....	.86	1.10	.86	.84	1.30	1.20	1.30
23	....	.84	1.10	.85	.86	1.30	1.20	1.30
24	....	.81	1.20	.86	.84	1.30	1.20	1.30
25	....	.80	1.40	.90	.80	1.28	1.20	1.30
26	....	.80	1.30	.90	.91	1.30	1.20	1.30
27	....	.80	1.60	.90	.88	1.36	1.20	1.30
28	....	.80	1.50	.90	1.50	2.20	1.20	1.30
29	....	.82	1.35	.86	1.07	2.10	1.15	1.30
30	1.06	.86	1.25	.85	1.00	1.95	1.15	1.30
31	....	....	1.20	.85	....	1.85	....	1.30

NOTE.—These gage heights refer to the staff gage installed May 30, 1911, and have no relation to the discharge given in the table which follows.

Daily discharge, in second-feet, of Whitewater Creek near Mogollon, N. Mex., for 1911.

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.0	....	35	15	9.8	3.3	10	3.2
2	1.6	....	35	14	8.8	2.3	9.5	1.7
3	1.1	....	36	14	8.8	6.2	7.5	1.7
4	1.1	....	35	16	6.4	5.4	7.0	1.7
5	1.7	....	29	18	6.4	5.4	6.6	1.7
6	2.0	....	20	....	6.4	4.8	5.3	1.7
7	2.0	....	20	....	7.1	5.4	3.9	1.2
8	2.0	....	20	....	7.1	6.2	4.3	1.1
9	2.0	....	20	....	4.3	10	3.9	1.1
10	42	....	20	....	4.3	....	3.3	3.7
11	....	....	21	....	7.9	14	3.3	2.9
12	....	....	21	....	12	20	3.3	2.5
13	42	....	21	20	7.7	17	3.1	2.5
14	23	32	20	18	4.5	13	2.9	9.1
15	15	32	19	18	3.6	9.5	2.9	2.8
16	15	32	18	15	3.3	10	2.9	3.6
17	15	35	17	14	3.6	9.5	2.8	2.4
18	9.6	32	18	14	3.1	8.3	2.5	2.0
19	26	32	18	14	3.1	10	3.2	2.1
20	29	32	18	14	3.9	12	2.9	2.0
21	29	33	17	13	3.5	10	2.9	2.0
22	17	32	14	11	3.7	9.1	2.4	1.9
23	17	....	19	8.8	2.9	11	2.0	2.0
24	20	....	20	9.9	2.4	15	2.4	1.9
25	20	....	20	14	1.9	....	2.9	1.2
26	17	37	20	14	2.0	....	3.7	2.9
27	15	36	20	14	2.0	....	2.9	2.4
28	15	37	19	11	1.9	....	2.9	....
29	15	35	18	9.1	2.0	20	3.7	14
30	15	37	18	9.1	2.9	18	2.0	18
31	14	35	....	9.1	....	....	2.0	....

NOTE.—Daily discharge determined from a weir and furnished by the Socorro Mines Co. No readings taken on the weir from Feb. 1 to Mar. 13. On Jan. 11 and 12 and Mar. 23 to 25 the discharge was above the capacity of the weir. From May 6 to 12, July 10, 25 to 28, and 31, and Sept. 28 the discharge over the weir was above 21 second-feet.

Monthly discharge of Whitewater Creek near Mogollon, N. Mex., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January, 29 days	42	1.1	14.7	846
March, 15 days	37	32	33.9	1,010
April	36	14	21.5	1,280
May, 24 days	20	8.8	13.6	647
June	12	1.9	4.9	292
July, 25 days	20	2.3	10.2	506
August	10	2.0	3.9	240
September, 29 days	18	1.1	3.3	190
The period				5,010

SAN CARLOS RIVER AT SAN CARLOS, ARIZ.

Location.—At Arizona & Eastern Railroad bridge a short distance above junction with Gila River, on the San Carlos Indian Reservation, half a mile east of San Carlos.

Records available.—August 17, 1910, to January 12, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff fastened to right pier of railroad bridge, downstream end.

Channel.—Shifting sand.

Discharge measurements.—Made from railroad bridge and by wading.

Accuracy.—On account of shifting character of stream, results are unsatisfactory, and no estimates have been prepared.

Daily gage height, in feet, of San Carlos River near San Carlos, Ariz., for 1911.

[J. B. Stone, observer.]

Day.	Jan.	Day.	Jan.	Day.	Jan.
1	10.2	5	10.2	9	10.2
2	10.2	6	10.2	10	10.35
3	10.2	7	10.2	11	12.05
4	10.2	8	10.2		

SAN PEDRO RIVER NEAR LEWIS SPRINGS, ARIZ.

Location.—About one-third mile below Charleston station, on the El Paso & Southwestern Railroad, in sec. 2, T. 21 S., R. 21 E., Gila and Salt River base and meridian, 6 miles above Fairbank, and 5 miles below Lewis Springs.

Records available.—January 27, 1904, to August 31, 1906; November 9, 1910, to November 26, 1911, when station was discontinued.

Drainage area.—Not measured.

Gage.—Inclined staff on right bank at proposed damsite about 1,000 feet below abandoned smelter, used 1910–11. Different gages at slightly different locations were used during 1904–1906.

Channel.—Shifting sand.

Discharge measurements.—Made from car and cable about one-fourth mile above gage.

Diversions.—About 50 acres irrigated from San Pedro River above the station.

Accuracy.—Measurements insufficient for estimates of discharge.

Discharge measurements of San Pedro River near Lewis Springs, Ariz., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 19	C. C. Jacob	3.88	23	Aug. 23	C. C. Jacob	4.66	70
Mar. 11	do	3.82	15	Sept. 26	do	4.57	25
Apr. 11	do	3.80	18	Nov. 15	do	4.65	12
July 14	do	4.70	100				

Daily gage height, in feet, of San Pedro River near Lewis Springs, Ariz., for 1911.

[M. Clymer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	4.0	3.9	4.1	3.8	3.7	3.7		4.0	4.4	4.6	4.6
2	3.75	3.9	4.0	3.8	3.7	3.7		4.0	4.4	5.0	4.6
3	3.75	3.9	3.9	3.8	3.7	3.7		4.0	4.4	4.6	4.6
4	3.95	3.9	3.9	3.8	3.7	3.7		4.0	5.2	4.65	4.6
5	3.95	3.7	3.9	3.8	3.7	3.7		4.0	4.45	3.75	4.6
6	3.95	3.7	3.9	3.8	3.75	3.7		4.0	4.4	6.25	4.6
7	3.96	3.7	3.9	3.8	3.9	3.65		4.0	4.4	5.0	4.6
8	3.9	3.7	3.9	3.8	3.8	3.65		5.7	4.4	4.7	4.6
9	3.9	3.7	3.9	3.8	3.8	3.6		4.0	4.4	4.7	4.6
10	3.9	3.7	3.9	3.8	3.8	3.6		5.0	5.25	4.65	4.6
11	3.9	3.7	3.8	3.8	3.8	6.0		4.25	4.8	4.65	4.6
12	3.9	3.7		3.8	3.8	4.5		4.0	5.25	4.65	4.6
13	3.9	3.7	3.6	3.8	3.8	4.0		4.5	7.4	4.65	4.6
14	3.55	3.7	3.8	3.8	3.8	4.0	5.3	4.5	7.75	4.6	4.6
15	3.65	3.7	3.8	3.8	3.8	4.0	4.9	4.5	5.35	4.6	4.6
16	3.9	3.7	3.8	3.8	3.8	3.95	4.65	4.4	5.25	4.6	4.6
17	3.9	3.7	3.8	3.8	3.75	3.9	4.6	4.3	5.6	4.6	4.6
18	3.9	4.1	3.8	3.8	3.75	3.9	5.8	4.3	6.8	4.6	4.6
19	3.9	3.96	3.8	3.8	3.7	4.4	5.5	4.3	5.3	4.6	4.6
20	3.85	3.9	3.8	3.8	3.7	4.25	6.25	5.5	4.8	4.6	4.6
21	3.9	3.9	3.8	3.8	3.7	4.0	5.25	6.25	4.6	4.6	4.6
22	3.9	3.9	3.8	3.8	3.7	3.95	4.9	4.6	4.6	4.6	4.6
23	3.9	3.9	3.8	3.8	3.7	3.85	4.6	4.7	4.6	4.6	4.6
24	3.9	3.9	3.8	3.75	3.7	3.65	4.55	4.5	4.6	4.6	4.6
25	3.9	3.9	3.8	3.75	3.7	3.5	4.5	5.7	4.55	4.6	4.6
26	3.9	3.9	3.8	3.75	3.7	3.65	4.45	6.0	4.75	4.6	4.6
27	3.9	3.9	3.8	3.7	3.7	3.8	4.3	4.5	4.6	5.3	
28	3.9	3.9	3.8	3.7	3.7	3.8	4.1	4.5	4.6	4.7	
29	3.9		3.8	3.7	3.7	3.8	4.0	4.5	4.6	4.8	
30	3.9		3.8	3.7	3.7	3.8	4.0	4.5	4.5	4.65	
31	3.9		3.8		3.7		4.0	4.45		4.6	

SAN PEDRO RIVER NEAR FAIRBANK, ARIZ.

Location.—At Boquillas diversion dam, in southern part of San Juan de las Boquillas grant, 2 miles above Fairbank.

Records available.—November 15 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Painted on vertical face of wing wall at left end of dam.

Channel.—Shifting sand

Discharge measurements.—Made from suspension footbridge 600 feet below dam and by wading.

Diversions.—Some water is used for irrigation above Charleston. Two irrigation canals divert water at the dam.

Accuracy.—Data insufficient for estimates of discharge.

Discharge measurements of San Pedro River near Fairbank, Ariz., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 15[a]	C. C. Jacob	3.70	12
Dec. 15	.....do	4.10	17

[a] Made from footbridge one-fourth mile above the station near Lewis Springs.

Daily gage height, in feet, of San Pedro River near Fairbank, Ariz., for 1911.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		4.2	11		4.5	21	4.1	4.1
2		4.2	12		4.5	22	4.1	4.1
3		4.2	13		4.5	23	4.1	4.1
4		4.2	14		4.2	24	4.1	4.1
5		4.2	15	3.7	4.2	25	4.0	4.1
6		4.5	16	3.8	4.2	26	4.0	4.4
7		4.5	17	3.8	4.2	27	4.0	4.4
8		4.5	18	4.2	4.1	28	4.1	4.0
9		4.5	19	4.2	4.1	29	4.1	3.9
10		4.5	20	4.1	4.1	30	4.1	3.9
						31		3.9

SANTA CRUZ RIVER NEAR NOGALES, ARIZ.

Location.—Just below proposed dam site on Yerba Buena ranch, about 7 miles northeast of Nogales, half a mile above the city pumping plant.

Records available.—March 22, 1907, to December 31, 1911; fragmentary.

Drainage area.—Not measured.

Gage.—Inclined staff fastened to large cottonwood tree on right bank a short distance below intake of small irrigation ditch.

Channel.—Shifting sand.

Discharge measurements.—Made from car and cable about 100 feet above gage, and by wading.

Diversions.—About 140 acres of land irrigated from this stream above the station. A small ditch takes water just above the station for irrigation a short distance below. At low stages a temporary ditch is built on the right bank; when this ditch is in operation the gage shows only the height of the water in the ditch.

Accuracy.—Because of the effect of the temporary ditch and the extremely shifting character of the stream bed, no estimates of discharge can be prepared from the data obtained.

Cooperation.—Gage height record furnished by officials of Santa Cruz County and the Nogales Board of Trade.

Discharge measurements of Santa Cruz River near Nogales, Ariz., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 21	C. C. Jacob	3.67	2.0	Nov. 16	C. C. Jacob	3.60	5.1
May 16	.....do	3.55	.65	Dec. 17	.....do	4.10	8.6
Aug. 30	.....do	3.30	2.0				

Daily gage height, in feet, of Santa Cruz River near Nogales, Ariz., for 1911.

[J. H. Harrison, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.2	3.2	3.3	3.0	2.7	2.2	....	3.2	3.8	3.4	3.4
2	3.2	3.2	3.3	3.0	2.65	2.2	....	3.2	3.4	3.4	3.4
3	3.2	3.2	3.3	3.0	2.6	2.2	....	3.2	3.2	3.4	3.4
4	3.2	3.2	3.3	3.0	2.6	2.1	....	3.2	3.2	3.4	3.4
5	3.2	3.2	3.3	3.0	2.6	2.1	....	3.2	4.8	3.4	3.4
6	3.2	3.2	3.25	3.0	2.6	2.1	....	3.2	4.6	3.4	3.4
7	3.2	3.2	3.25	3.0	2.55	2.1	4.3	3.2	4.1	3.4	3.4
8	3.2	3.2	3.2	3.0	2.55	2.1	3.0	3.2	3.9	3.4	3.4
9	3.2	3.2	3.2	3.0	2.55	2.1	2.7	3.2	3.9	3.4	3.4
10	3.2	3.2	3.2	3.0	2.5	2.1	2.7	3.2	3.8	3.35	3.4
11	3.4	3.2	3.2	2.9	2.5	2.1	2.5	3.2	3.8	3.4	3.4
12	3.4	3.2	3.15	2.9	2.5	2.1	2.5	3.2	3.8	3.4	3.4
13	3.4	3.2	3.15	2.9	2.5	2.0	....	4.0	....	3.4	3.4
14	3.4	3.2	3.1	2.9	2.5	2.0	....	3.4	3.7	3.4	3.4
15	3.4	3.2	3.1	....	2.5	2.0	....	5.1	3.6	3.4	3.4
16	3.35	3.2	3.1	2.9	2.4	2.0	....	4.2	3.6	3.6	3.4
17	3.3	3.3	3.1	2.8	2.4	2.0	....	4.4	3.6	3.55	3.4
18	3.3	3.3	3.0	2.8	2.35	....	....	3.4	3.5	3.5	3.4
19	3.3	3.3	3.0	2.75	2.35	....	....	3.3	3.5	3.5	....
20	3.3	3.25	3.0	2.75	2.3	....	3.8	3.2	3.5	3.5	3.4
21	3.25	3.25	3.0	2.7	2.3	....	4.4	3.2	3.5	3.45	3.4
22	3.25	3.2	3.0	2.7	2.3	....	4.1	3.4	3.4	3.45	3.5
23	3.2	3.2	3.0	2.7	2.3	....	3.2	3.3	3.4	3.45	3.55
24	3.2	3.2	3.0	2.7	....	....	2.8	3.3	3.4	3.45	3.55
25	3.2	....	3.0	2.7	....	....	2.8	3.3	3.4	3.45	3.55
26	3.2	3.2	3.0	2.7	....	....	5.0	3.3	3.4	3.4	3.5
27	3.2	3.2	3.0	2.7	2.3	....	3.7	3.3	3.4	3.4	3.5
28	3.2	3.2	3.0	2.7	2.3	....	3.2	3.3	3.4	3.4	3.55
29	3.2	....	3.0	2.7	2.2	....	3.1	4.4	3.4	3.4	3.55
30	3.2	....	3.0	2.7	2.2	....	3.1	4.1	3.45	3.4	3.55
31	3.2	....	3.0	....	2.2	....	3.1	....	....	....	3.55

SANTA CRUZ RIVER AT TUCSON, ARIZ.

Location.—At Congress Street Bridge at Tucson, in sec. 13, T. 14 S., R. 13 E.

Records available.—October 15, 1905, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Painted on bridge pier on left bank. During 1911 main channel was near right bank and gage heights were obtained by measuring from bench mark on bridge to water surface.

Channel.—Shifting sand.

Discharge measurements.—Made from bridge or by wading.

Accuracy.—Gage heights too fragmentary and uncertain for publication; estimates of daily discharge can not be presented.

Cooperation.—Data furnished by Arizona experiment station through G. E. P. Smith, irrigation engineer.

Discharge measurements of Santa Cruz River at Tucson, Ariz., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Aug. 21	F. C. Kelton	0.34	159	Sept. 15	F. C. Kelton	1.10	416
22	.....do	1.18	606	18	.....do	1.08	341
22	.....do	1.20	550	18	.....do	.60	243
24	.....do	—.25	[a] 12				

[a] Estimated.

RILLITO CREEK NEAR TUCSON, ARIZ.

Location.—At Oracle Road Bridge, in sec. 23, T. 13 S., R. 13 E., about 4 miles north of Tucson, Ariz.

Records available.—1909 to 1911.

Drainage area.—Not measured.

Gage.—Water-stage register (French manufacture) attached to right abutment of bridge.

Channel.—Wide and shallow; shifting sand.

Discharge measurements.—Made from bridge or by wading.

Accuracy.—Results are approximate; estimates of daily discharge are not of sufficient completeness and accuracy to publish. No gage heights available.

Cooperation.—Data furnished by Arizona experiment station through G. E. P. Smith, irrigation engineer.

Discharge measurements of Rillito Creek near Tucson, Ariz., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 12	F. C. Kelton	3.85	129	July 17	F. C. Kelton	4.00	530
12	do	3.70	88	17	do	3.85	290
12	do	3.69	64	17	do	3.75	205

SALT RIVER BASIN.

SALT AND VERDE RIVERS AT McDOWELL, ARIZ.

The following estimates of monthly discharge are published as furnished by the United States Reclamation Service. For description of irrigation plan of the Salt River project in Arizona, see Tenth Annual Report of the Reclamation Service.

Estimated monthly discharge of Salt and Verde rivers for 1911.

Month.	Salt River near Roosevelt, Ariz. (drainage area 5,756 square miles).		Verde River at McDowell, Ariz. (drainage area 6,000 square miles).	
	Mean discharge in second-feet.	Run-off, total in acre-feet.	Mean discharge in second-feet.	Run-off, total in acre-feet.
January	66,898	132,691	90,009	178,534
February	81,080	160,820	72,086	142,976
March	135,076	267,919	73,518	145,830
April	33,429	66,306	12,900	25,587
May	17,481	34,673	14,874	29,501
June	8,663	19,166	8,509	16,878
July	19,102	37,888	13,756	27,284
August	10,790	21,402	7,580	15,034
September	7,352	14,582	16,551	32,829
October	28,074	55,684	21,108	41,868
November	11,863	23,530	15,304	30,356
December	7,246	14,372	18,291	37,529
The year	35,671	849,033	30,374	724,196

VERDE RIVER NEAR CAMP VERDE, ARIZ.

Location.—Just below power plant of Arizona Power Co. at Camp Childs, Ariz., about 19 miles southeast of Camp Verde, Ariz., and about 3 miles above mouth of Fossil Creek.

Records available.—February 26 to December 31, 1911.

Drainage area.—Not measured.

Gage.—Inclined staff in three sections on left bank about 300 feet below power plant of Arizona Power Co.

Channel.—Bowlders and bedrock; apparently permanent.

Discharge measurements.—Made from car and cable 1 mile above gage.

Diversions.—About 60 second-feet of water diverted from Fossil Creek used for power development and returned to the river above the gage.

Accuracy.—No estimates can be prepared until additional discharge measurements are made.

Cooperation.—Gage height record furnished by the United States Reclamation Service.

The following discharge measurement was made by C. C. Jacob:

August 5, 1911: Gage height, 5.02 feet; discharge, 208 second-feet.

Daily gage height, in feet, of Verde River near Camp Verde, Ariz., for 1911.

[O. O. Stevens, R. C. Ricketts, observers.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		5.45	4.5	3.35	3.5	3.75		5.1	5.5	5.5	5.2
2		5.45	4.5	3.3	3.6	3.9		5.0	5.7	5.4	5.2
3		5.9	4.4	3.3	3.55	4.0		5.0	5.6	5.4	5.2
4		6.05	4.3	3.3	3.6	4.5		5.0	5.5	5.4	5.2
5		10.95	4.15	3.3	3.6	4.0		5.0	6.4	5.25	5.2
6		12.75	4.1	3.3	3.55	3.9	5.0	4.9	7.9	5.4	5.2
7		11.2	4.1	3.3	3.55	4.9	5.0	4.9	6.45	5.3	5.2
8		8.0	4.05	3.3	3.5	5.3	5.0	4.85	5.9	5.25	5.2
9		7.5	3.85	3.4	3.55	4.2	4.9	4.9	5.55	5.2	5.2
10		7.3	3.8	3.4	3.5	3.9	5.2	4.9	5.45	5.2	5.2
11		13.75	3.7	3.35	3.45	3.75	5.0	4.9	5.4	5.2	5.2
12		8.7	3.65	3.35	3.4	3.65	4.75	5.5	5.3	5.2	5.2
13		7.2	3.5	3.3	3.6	3.75	4.9	5.4	5.3	5.2	5.2
14		6.55	3.5	3.35	3.55	3.55	4.9	5.7	5.3	5.2	5.2
15		6.15	3.5	3.4	3.5	3.5	4.9	5.5	5.2	5.2	5.2
16		5.95	3.5	3.4	3.5	3.6	4.9	5.3	5.2	5.2	5.2
17		5.7	3.5	3.4	3.5	4.3	4.8	5.2	5.2	5.2	5.2
18		5.45	3.5	3.4	3.4	5.5	5.0	5.1	5.2	5.2	5.3
19		5.25	3.5	3.4	3.4	4.4	4.9	5.1	5.2	5.2	5.3
20		5.15	3.5	3.4	3.6	5.6	4.9	5.5	5.2	5.2	5.3
21		5.1	3.4	3.4	4.0	6.5	5.25	5.55	5.2	5.2	5.3
22		5.0	3.4	3.4	3.65	6.9	5.9	5.3	5.2	5.25	5.3
23		5.0	3.4	3.4	3.55	6.0	5.7	5.45	5.2	5.25	5.3
24		4.95	3.3	3.4	3.6	5.5	5.85	5.1	5.1	5.2	5.3
25	5.5	4.9	3.3	3.4	3.5	6.6	5.8	5.2	5.1	5.2	5.3
26	5.45	4.9	3.3	3.4	3.5	5.55	5.5	5.2	5.15	5.2	5.3
27	5.45	4.8	3.2	3.5	3.5	5.1	5.4	5.2	5.4	5.2	5.3
28	5.45	4.75	3.2	3.5	3.35	5.65	5.6	5.1	5.6	5.2	5.3
29		4.7	3.3	3.55	3.4	5.3	5.4	5.15	5.85	5.2	5.3
30		4.7	3.3	3.5	3.45	5.1	5.3	5.2	5.75	5.2	5.3
31		4.65		3.5		5.0	5.2		5.5		5.3

AGUA FRIA RIVER NEAR GLENDALE, ARIZ.

Location.—At old diversion dam of the Beardsley irrigation project at Camp Dyer, in sec. 28, T. 6 N., R. 1 E., Gila and Salt River base and meridian, 4 miles below mouth of Castle Creek and 22 miles northwest of Glendale.

Records available.—November 10, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Painted on the upstream face of the dam at the right of the opening for each channel. At low and medium stages the stream flows through the larger opening, which is near the right bank. The openings in the dam were made during the flood of 1895, when a portion of the masonry near each end was washed out.

Channel.—Shifting sand.

Discharge measurements.—Made by wading.

Accuracy.—Measurements insufficient for estimates of daily and monthly discharge for 1911. Full reliance can not be placed on the gage-height record after January 26, 1911.

Cooperation.—Gage-height record is furnished by the Beardsley Irrigation Co., A. L. Harris, engineer, through the watchman at the dam.

Discharge measurements of Agua Fria River near Glendale, Ariz., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 7	C. C. Jacob	24.65	658
May 5	.....do	21.50	3.5
Oct. 10	.....do	22.85	2.7
Dec. 21	.....do	22.10	6.2

Daily gage height, in feet, of Agua Fria River near Glendale, Ariz., for 1911.

[R. Jones, observer.]

Day.	Jan.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	21.2	....	21.5	21.5	22.8	22.8	24.0	22.1	22.1
2	21.2	....	21.5	21.5	22.8	22.8	22.9	22.1	22.1
3	21.2	....	21.5	21.5	22.8	22.8	22.9	22.1	22.1
4	21.2	....	21.5	21.5	22.8	22.8	22.9	22.1	22.1
5	21.2	21.5	21.5	21.5	22.8	22.8	22.95	22.1	22.1
6	21.05	21.5	21.5	21.5	22.8	22.8	22.95	22.1	22.1
7	21.05	21.5	21.5	21.5	22.8	22.8	23.0	22.1	22.1
8	21.0	21.5	21.5	21.5	22.8	22.8	22.9	22.1	22.1
9	21.0	21.5	21.5	21.5	22.8	22.8	22.9	22.1	22.1
10	22.75	21.5	21.5	21.5	22.8	22.8	22.9	22.1	22.1
11	30.05	21.5	21.5	21.5	22.8	22.8	22.9	22.1	22.1
12	25.15	21.5	21.5	21.5	22.8	22.8	22.9	22.1	22.1
13	23.75	21.5	21.5	21.5	22.8	22.8	22.9	22.1	22.1
14	23.1	21.5	21.5	21.5	22.8	22.8	22.9	22.1	22.1
15	23.0	21.5	21.5	21.5	22.8	22.8	22.9	22.1	22.1
16	22.85	21.5	21.5	22.05	22.8	22.8	22.9	22.1	22.1
17	22.75	21.5	21.5	25.05	22.8	22.8	22.9	22.1	22.1
18	22.7	21.5	21.5	22.75	22.8	22.8	22.9	22.1	22.1
19	22.7	21.5	21.5	25.1	22.8	22.8	22.9	22.1	22.1
20	22.65	21.5	21.5	22.35	22.9	22.8	22.9	22.1	22.1
21	22.65	21.5	21.5	25.6	22.95	22.8	22.9	22.1	22.1
22	22.6	21.5	21.5	25.6	23.0	22.8	22.9	22.1	22.1
23	22.6	21.5	21.5	23.5	25.0	22.8	22.9	22.1	22.1
24	22.5	21.5	21.5	23.5	23.0	22.8	22.9	22.1	22.1
25	22.55	21.5	21.5	....	23.0	22.8	22.9	22.1	22.1
26	22.6	21.5	21.5	....	22.9	22.8	22.9	22.1	22.1
27	....	21.5	21.5	....	22.9	22.9	23.4	22.1	22.1
28	....	21.5	21.5	....	22.8	22.9	26.2	22.1	22.1
29	....	21.5	21.5	....	22.8	22.9	23.2	22.1	22.1
30	....	21.5	21.5	....	22.8	23.0	23.0	22.1	22.1
31	....	21.5	....	....	22.8	....	23.0	....	22.1

NOTE.—Gage heights for period Jan. 27 to May 4 not published, as they are very uncertain.

HASSAYAMPA RIVER NEAR WICKENBURG, ARIZ.

Location.—Half a mile below Brills station, on the Atchison, Topeka & Santa Fe Railway, in sec. 20, T. 7 N., R. 4 W., Gila and Salt River base and meridian, about 4 miles below Wickenburg, Ariz.

Records available.—November 23, 1910, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff bolted to bedrock on right bank one-half mile below Brill's ranch. May 10, 1911, a vertical staff at an independent datum was installed opposite ranch house, half a mile above original gage. See note to gage-height table.

Channel.—Shifting sand.

Discharge measurements.—Made by wading.

Diversions.—Small ditch diverts water for irrigation at Wickenburg.

Accuracy.—Measurements insufficient for the preparation of discharge estimates.

Discharge measurements of Hassayampa River near Wickenburg, Ariz., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 5	C. C. Jacob	4.65	5.6	July 17	C. C. Jacob	4.05	3.5
Feb. 21	do	(a)	6.4	Aug. 15	do	4.05	3.0
Apr. 4	do	(a)	8.5	Dec. 28	do	3.88	1.0
May 10	do	4.00	5.8	29	do	4.03	4.1

[a] No water at gage.

Daily gage height, in feet, of Hassayampa River near Wickenburg, Ariz., for 1911.

Day.	Jan.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.70		3.95	4.02		4.06	4.05	4.02	4.02
2	4.70		4.20	4.10		3.95	4.08	4.02	4.02
3	4.70		4.02	4.10		3.98	4.08	4.02	4.02
4	4.65		4.00	4.18		4.08	4.08	4.02	4.02
5	4.60		4.05	4.08		4.08	4.08	4.02	4.02
6	4.64		4.05	4.02		4.08	4.08	4.02	4.02
7	4.66		4.05	4.00		4.06	4.02	4.02	4.02
8	4.62		4.25	4.05		4.04	4.02	4.02	4.02
9	4.66		4.05	4.05		4.04	4.02	4.02	
10	5.05	4.00	4.05	4.02		4.06	4.02	4.02	4.02
11	5.75	4.10	4.05	4.02		4.06	4.02	4.02	4.02
12		4.10	4.05	4.08		4.15	4.02	4.02	4.02
13		4.10	4.05	4.09		4.09	4.02	4.02	4.02
14		4.10	4.25	4.05		4.08	4.02	4.02	4.02
15		4.10	3.98	4.08	4.00	4.10	4.02	4.02	4.02
16		4.08	3.98	4.09	4.08	4.06	4.02	4.02	4.02
17		4.08	3.98	4.20	4.09	4.02	4.02	4.02	4.02
18		4.05	3.98	4.12	4.06	4.02	4.02	4.02	4.02
19		4.08	3.98		4.04	4.04	4.02	4.02	
20		4.08	3.98		4.12	4.02	4.02	4.02	
21		4.08	4.00		4.10	4.02	4.02	4.02	
22		4.08	4.00		4.38	4.02	4.02	4.02	
23		4.10	4.02			4.02	4.02	4.02	
24		4.12	4.05		4.15	4.02	4.02	4.02	
25		4.12	4.05		4.05	4.02	4.02	4.02	
26		4.12	4.05		4.08	4.07	4.02	4.02	
27		4.12	4.05		4.09	4.02	4.02	4.02	
28		4.10	4.05		4.15	4.02	7.50	4.02	
29		4.08	4.05		4.09	4.02	4.02	4.02	4.63
30		4.02	4.00		4.06	4.23	4.02	4.02	
31		4.05			4.06		4.02		

NOTE.—Jan. 12, river cut a new channel and no further records were obtained until May 10, when a gage was installed half a mile above the old gage. Gage not read Aug. 23 on account of flood. Gage heights Sept. 30 and Oct. 28 estimated by hydrographer.

SALTON SINK.

Stream-flow data for the Salton Sink basin, which previous to 1910 were published with the Colorado River data, are now presented in the report for the Great Basin (Water-Supply Paper 310), of which the sink is logically a part.

WHITE RIVER[1] NEAR DOUGLAS, ARIZ.

Location.—At electric railway bridge in sec. 11, T. 24 S., R. 27 E., about 1½ miles west of Douglas, Ariz.

Records available.—August to December, 1911.

Drainage area.—Not measured.

Gage.—Vertical staff fastened to pile bent of bridge in center of channel.

Channel.—Shifting sand.

Discharge measurements.—Made from bridge or by wading.

Accuracy.—Estimates of daily discharge are not considered sufficiently accurate for publication.

Cooperation.—Gage height record furnished by Arizona experiment station through G. E. P. Smith, irrigation engineer.

Discharge measurements of White River near Douglas, Ariz., in 1911.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 25	Jacob and Smith	3.50	3.5
Nov. 14	Jacob and Ballard	3.70	1.3
Dec. 14	C. C. Jacob	3.58	1.1

Daily gage height, in feet, of White River near Douglas, Ariz., for 1911.

Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.
1		3.43	3.68	11		3.68		21		4.09	
2		3.41	3.65	12		3.51		22		3.80	
3		3.40	3.65	13		5.92		23		3.68	
4		3.35	3.65	14		4.87		24	3.55	3.65	
5		3.50	9.74	15		3.60		25	3.80	3.55	
6		4.31	5.81	16		3.50		26	6.20	3.55	
7		3.72	4.43	17		6.90		27	6.50	4.57	
8		3.51	3.92	18		6.44		28	4.30	3.68	
9		3.48	3.72	19		7.48		29	4.30	4.67	
10		4.18	3.60	20		4.92		30	3.80	3.75	
								31	3.55		

FLOOD OF OCTOBER, 1911, IN THE REGION OF THE SAN JUAN, SAN MIGUEL, AND LA PLATA MOUNTAINS.

By G. H. Russell and G. A. Gray.

From September 25 to October 6, 1911, rain was general over a large portion of the Rocky Mountain region and was heavy, increasing with the elevation, on the slopes of the San Juan, San Miguel, and La Plata Mountains, from which flow the headwaters of San Juan, Dolores, Chama, Rio Grande, and Gunnison Rivers. Until October 5, however, the fall had at no time been excessive, and the rivers and their tributaries were easily carrying the run-off within their banks, but on that day a very heavy downpour occurred on the higher slopes of the ranges, above altitude 7,000 feet.

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[1] White River flows southward into Mexico and discharges into the Gulf of California.

At Gladstone, Colo., elevation 10,500 feet, the United States Weather Bureau recorded 8.05 inches for the day. Below this elevation the precipitation diminished, although as far down as Pagosa Springs it amounted to 3.67 inches and at Uncompahgre 3.70 inches.

All the precipitation was in the form of rain, which carried with it to the streams any snow that had previously fallen on the upper slopes. The exceptionally heavy run-off caused by such a combination of phenomena, poured into streams already full to their banks, resulted in extraordinarily high stages on all rivers heading in the region.

Chama River overflowed its banks, inundated all bottom lands, and caused considerable damage to ranches and bridges along its course. At Chama, N. Mex., the Denver & Rio Grande Railroad bridge and several hundred feet of track were taken out.

Conejos River also left its banks and did considerable damage. The channel at Jacob's ranch shifted entirely away from the gage and bridge to which the gage was attached. The maximum discharge at this point was probably close to 6,000 second-feet.

The Rio Grande at Wason and Del Norte, Colo., reached a height never before recorded. At Del Norte the State engineer's gage registered a maximum of 5.9 feet, the estimated maximum discharge being 12,000 second-feet. At Wason the State's automatic gage registered 7.05, the maximum discharge being close to 8,000 second-feet.

Some damage was done to ranches and also irrigation in the vicinity of Del Norte and Monte Vista, Colo. The roadbed of the Creede branch of the Denver & Rio Grande Railroad was so damaged that traffic was delayed for several days.

Dolores River at Dolores reached a height of 10.2 feet on the State engineer's gage, or about 8 feet above low-water stage. The estimated discharge at this stage is about 10,000 second-feet. The Rio Grande Southern Railroad suffered the greatest loss in this valley, much of its track being entirely destroyed and all more or less damaged for a stretch of 35 miles. Agriculturists along the course also sustained severe losses.

On San Miguel and Uncompahgre rivers conditions were similar to those on the other streams, but the damage was probably not so great.

The San Juan and its upper tributaries reached stages that exceeded any in memory or tradition. The Animas at Durango registered 13.6 feet on the State engineer's gage, or 11.5 feet above low water. At Aztec, N. Mex., flood marks showed the river to have reached a height of 13.5 feet, or 10.5 feet above normal. The maximum discharge at Aztec was probably 30,000 second-feet. Great damage was done in the valley to agriculture and irrigation construction. In many places low-lying farms were ruined and crops were washed away. Several bridges were taken out and others badly damaged. The Denver & Rio Grande Railroad suffered severe losses on both the Silverton and Farmington branches. Farmington, N. Mex., was cut off from railroad communication for about 50 days and Silverton, Colo., about 60 days.

On the San Juan proper at Arboles, above the mouth of the Piedra, the river rose about 17 feet above normal, the estimated discharge being 40,000 second-feet. The velocity of the flood is indicated by the report of the advance of the crest, which is said to have passed Pagosa Springs, Colo., at 12.30 p. m. and reached Pagosa Junction, Colo., at 5 p. m., the distance being about 35 miles. The crest must therefore have advanced at an average speed of between 7 and 8 miles per hour (10 to 12 feet per second). At Bloomfield, N. Mex., the river reached nearly 12 feet on the United States Geological Survey gage, and the gage and bench marks were destroyed. From flood marks and cross section the maximum discharge at this point is estimated at nearly 80,000 second-feet. At Shiprock, N. Mex., where the river was carrying the combined waters of the La Plata, Animas, and San Juan, the maximum gage height of over 22 feet, which no doubt is 18 to 20 feet above low water, was reached and the maximum discharge was probably 150,000 second-feet. The river here overflowed its banks to a depth of several feet, entirely submerging the grounds of the Indian School, destroying several of the smaller buildings, and inflicting more or less damage on the larger. In this vicinity several adobe houses with their contents were destroyed.

The damage done on the San Juan probably far exceeds that on any of the other streams. The Denver & Rio Grande Railroad lost heavily on its line between Navajo and Arboles, Colo., fully 7 miles of track being entirely destroyed, and perhaps 17 miles damaged to such an extent that repair would be necessary. The company also sustained some losses on Pine River (Los Pinos).

Great damage was done to farms and towns along the course of the San Juan. From the junction of Pine River to Farmington, N. Mex., a strip of farming land probably one-eighth mile in average width was washed away or covered with débris. At one point 9 acres of orchard in fruit was washed away; at another 10 acres of orchard disappeared entirely. All irrigation headings were practically destroyed. On farm lands that were inundated the year's crop was lost and fences and other improvements were heavily damaged. A number of houses and outbuildings, including furnishings and farming implements, were washed away. A large number of cattle, horses, hogs, and other live stock were caught in the high water and swept away. Five people are known to have lost their lives.

All wagon bridges on the entire course of the river were taken out. The loss from this item alone, taking into consideration the inconvenience caused by their destruction, would easily amount to $50,000. The losses to farms on the stretch of the river between the mouth of Pine River and Farmington, N. Mex., were probably close to $150,000. No pecuniary estimate is made of the amount of damage done above the mouth of Pine River on the Pine, Piedra, San Juan, and its tributaries.

Heavy floods also occurred on the La Plata and Mancos. Here, as on other streams, agriculture suffered severe losses.

Canon Largo and other tributaries from the east and south, being outside the heavy rain belt, were only in moderate flood and did little if any damage.

An estimate in dollars and cents of the damage done by the flood is hardly possible without the aid of a census. Occurring near the close of the harvest season, it probably caused greater loss in farm products than could have been sustained at any other period. The inconvenience caused by railroad isolation is also an item of considerable consequence. If these valleys had the population they are able to support the calamity would have been great.

It is to be noted that reservoirs situated in the path of a flood of this character, unless of large capacity, would have been put to a most severe test. Large reservoirs, however, would have been of great benefit in storing, equalizing, and distributing the run-off, and in preventing the river from attaining such destructive dimensions. During the period of this flood the San Juan drainage area probably released 400,000 acre-feet of water. As plenty of land susceptible of irrigation is available in this region for waters thus stored, reservoirs would serve the double purpose of flood prevention and irrigation.

MISCELLANEOUS MEASUREMENTS.

Miscellaneous measurements in Colorado River drainage basin in 1911.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Mar. 25	Right canal	Ferron Creek	Ferron, Utah		1.14
25	Left canal	do	do		2.80
Jan. 16	Fraser River	Grand River	Canyon between Arrow and Fraser.		[a] 15.0
Feb. 8	do	do	do		[a] 12.0
Apr. 3	do	do	Granby, Colo.		114
Sept. 13	Vasques Creek	Fraser River	2¼ miles southeast of Fraser, Colo.		18.7
13	St. Louis Creek	do	½ mile northeast of Fraser, Colo.		20.1
Dec. 8	do	do	do		14.6
Aug. 18	Eagle River	Grand River	Above mouth of Gore Creek		98.3
18	Gore Creek	Eagle River	Mouth		26.7
17	J. F. McCoy ditch	do	Bridge to Hanewald ranch		5.7

[a] Discharge estimated.

Miscellaneous measurements in Colorado River drainage basin in 1911—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
June 13	High line canal	West Divide Creek.	Beard's ranch near Raven, Colo.	1.13	35.9
Mar. 18	Gunnison River	Grand River	Whitewater, Colo	[a] 14.80	1,290
14	Tomichi Creek	Gunnison River.	Gunnison, Colo	.79	164
20	Uncompahgre River	do	8 miles north of Montrose, Colo.	2.15	148
20	do	do	8 miles south of Montrose, Colo.	2.10	106
19	Nigger Gulch	do	Stratler, Colo		0
19	Alkali Creek	do	Mouth		0
19	Roubideau Creek	do	Denver & Rio Grande R. R. crossing.		[b] 12.0
19	Escalante Creek	do	Mouth		0
19	Wells Gulch	do	do		0
19	Deer Creek	do	do		0
19	Big Domingues Creek	do	do		[b] 1.0
19	Kumali Creek	do	do		[b] .5
19	Indian Creek	Kumali Creek.	do		0
19	Whitewater Creek	Gunnison River.	Whitewater, Colo		[b] .5
May 3	Oak Spring ranch ditch.	Fremont River.	Emery, Utah	1.3	2.6
June 3	do	do	do	1.15	4.45
July 22	do	do	do	1.05	2.8
Sept. 8	do	do	do	1.0	.72
Oct. 11	do	do	do	.98	1.08
May 2	Red Creek	do	do		19.2
Oct. 11	do	do	do		1.41
11	Deer Creek	do	do		.78
11	do	do	do		.41
11	do	do	do		.30
May 2	Clear Creek	do	do		1.6
June 7	Miller ditch	do	Miller's ranch near Emery, Utah.		4.24
7	Muddy Creek	do	Lewis ranch near Emery, Utah.		40.8
Sept. 8	Quitchumpah Creek	do	County road near Emery, Utah.		.10
Oct. 11	do	do	do		1.43
May 9	Bill Williams River	Colorado River	Near Swansea, Ariz		1.3
Dec. 2	Gila River	do	Winkelman, Ariz		84
Sept. 2	Animas River	San Juan River.	Durango, Colo	3.70	4.90
Nov. 24	Little Navajo River	Navajo River	Chromo, Colo		19.0
Jan. 31	Mangus Creek	Gila River	Silver City and Mogollon road, N. Mex.		[b] .5
31	Duck Creek	do	Near Cliff, N. Mex		[b] 2.0
30	Whitewater Creek	Rio San Francisco.	Glenwood, N. Mex		7.4
Nov. 2	Chase Creek	do	Clifton, Ariz		[c] 5.3
Dec. 2	Arizona Copper Co. flume.	do	do		[c] 14.0
Feb. 3[d]	San Jose canal	Gila River	2 miles below headworks, near Solomonville, Ariz.		56
3[d]	Montezuma canal	do	Near Solomonville, Ariz		38
3[d]	Union canal	do	do		[e] 186
Aug. 22	San Pedro River	do	At railroad bridge at Benson, Ariz.		48
Dec. 2	do	do	Winkelman, Ariz		11
May 1	Verde River	Salt River	At former United States Reclamation Service gaging station at McDowell, Ariz.	7.45	129
May 20	do	do	do	7.35	106
Dec. 8	do	do	do	8.20	197
Apr. 4	Hassayampa River	Gila River	½ mile below Wickenburg, Ariz.		1.0

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[a] The gage height was taken from a reference point.

[b] Discharge estimated.

[c] This measurement was included in the measurement made on San Francisco River at Clifton, Ariz., at the regular United States Geological Survey gaging station.

[d] Canals full.

[e] Floats.

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